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Chapter 1

Purpose of and Need for the Project

Introduction

The Santa Clara Valley Water District (District) proposes to construct the lower Guadalupe River Flood Protection Project (LGRP) in a 10.5-kilometer (km) (6.5-mile) project area along the lower Guadalupe River between Interstate 880 (I-880) and the Union Pacific Railroad (UPRR) bridge in the cities of San Jose and Santa Clara (figure 1-1). The LGRP proposes to modify previous flood-control improvements initiated in 1982 and 1995 on the lower Guadalupe River. These modifications would restore the flood conveyance capacity of the existing channel and provide additional capacity to convey floodflows of approximately 481 cubic meters per second (cms) (17,000 cubic feet per second [cfs]) during a design flood event. The proposed modifications include balancing the need for flood-control structures, sediment management, and routine channel maintenance with the goal of protecting and enhancing environmental conditions and public access.

The District has authorized the LGRP and is the lead agency for compliance with the California Environmental Quality Act (CEQA). The intent of this environmental impact report (EIR) is to support decision making by the District and comply with public disclosure requirements of CEQA. The District had originally initiated a combined CEQA/National Environmental Policy Act (NEPA) process to support District and U.S. Army Corps of Engineers (Corps) decision making. In May 2001, the Corps informed the District that it would not pursue an environmental impact statement (EIS) because of the relatively minor impacts of the LGRP associated with discharge of dredged and fill material in jurisdictional waters of the United States, including wetlands (appendix A). The Corps will conduct a separate NEPA review as part of its Clean Water Act (CWA) permitting process.

The District has determined that the LGRP may have a significant impact on the quality of the human environment and that an EIR is necessary under CEQA. The District will use the EIR to support project decision making and to meet CEQA requirements for disclosure of potential environmental impacts and mitigation measures.

This EIR provides sufficient information for approval of the LGRP and compliance with CEQA. It presents

- a reasonable range of alternatives,
- analyses of the direct and indirect impacts of the alternatives,
- recommendations for mitigation measures to reduce significant impacts to less-than-significant levels,
- cumulative impact analyses, and
- discussion of related environmental laws and permits that are integrated into the EIR review process.

The LGRP is located downstream of the flood protection projects for both the upper Guadalupe River and downtown San Jose. Flood protection projects have been initiated for these 2 reaches. Proposed flood protection work for the upper Guadalupe River project has been authorized under Section 101(a)(9) of the Water Resources Development Act (WRDA) of 1999 (Public Law [PL] 106-53). The downtown San Jose Guadalupe River project has been authorized under Section 401(b) of the WRDA of 1986 (PL 99-662) and is a federally authorized project (U.S. Army Corps of Engineers 1993). The LGRP is required to convey design floodflows from both the upper river and downtown projects.

Lower Guadalupe River History and Background

The Guadalupe River begins at the confluence of Alamitos Creek and Guadalupe Creek, just downstream of Coleman Road in San Jose. From its beginning, the river flows north approximately 22.5 km (14 miles) through urbanized portions of San Jose and Santa Clara, eventually discharging into San Francisco Bay through Alviso Slough (figure 1-1). At State Route (SR) 237, the Guadalupe River has a total drainage area of approximately 414 square kilometers (km^2) (160 square miles). The lower Guadalupe River reaches receive runoff from an urbanized region, which comprises a steep upper watershed, an urban residential and light commercial zone, and a significantly developed and growing downtown commercial zone. Storm drainage from these areas and from stormwater pump flows within the

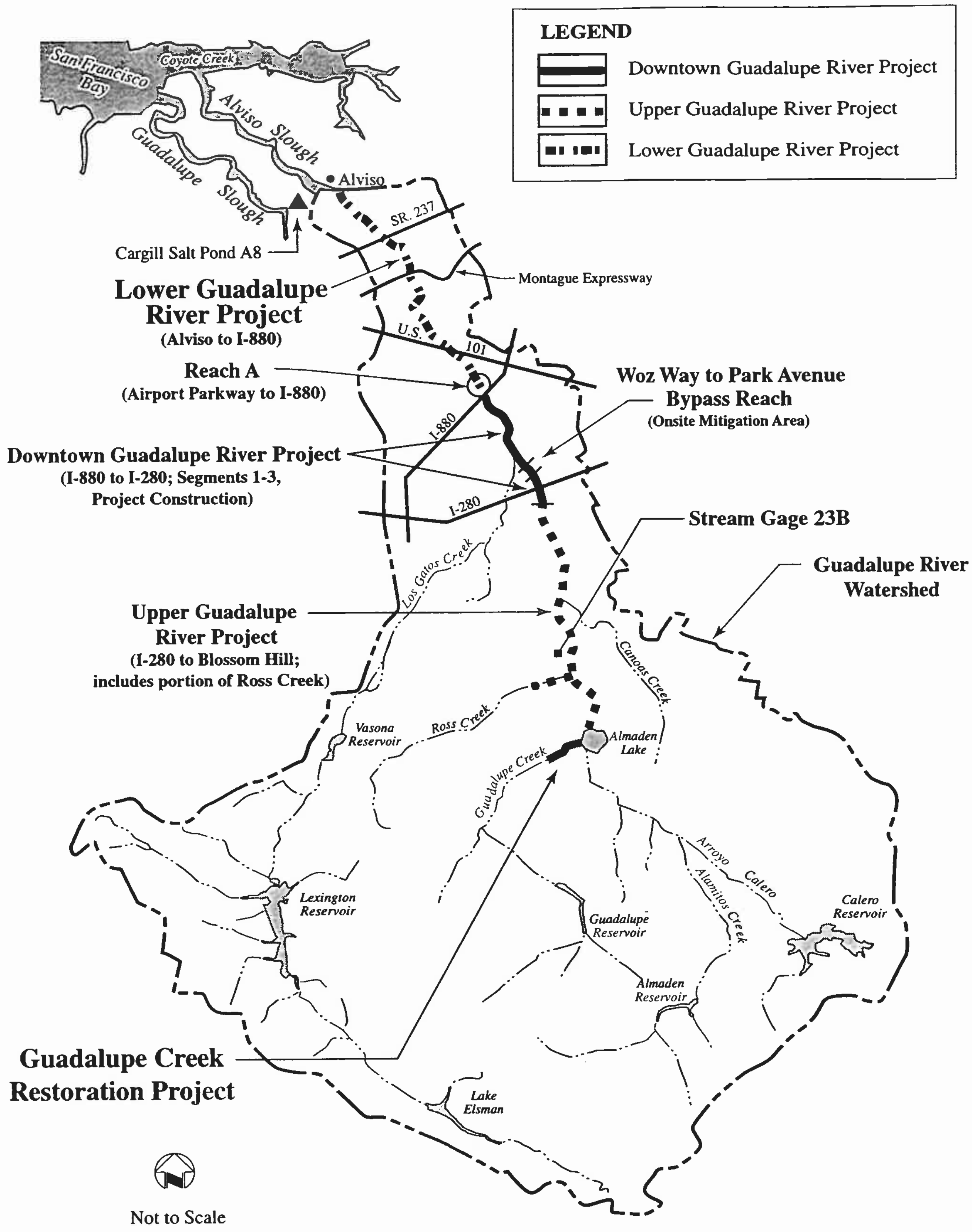
LEGEND
Downtown Guadalupe River Project
Upper Guadalupe River Project
Lower Guadalupe River Project
San Francisco Bay
Coyote Creek
Alviso Slough
Guadalupe Slough
Alviso
SR. 237
Cargill Salt Pond A8
Montague Expressway
Lower Guadalupe River Project
(Alviso to I-880)
U.S. 101
Reach A
(Airport Parkway to I-880)
Woz Way to Park Avenue Bypass Reach
(Onsite Mitigation Area)
I-880
Downtown Guadalupe River Project
(I-880 to I-280; Segments 1-3, Project Construction)
I-280
Stream Gage 23B
Guadalupe River Watershed
Los Gatos Creek
Upper Guadalupe River Project
(I-280 to Blossom Hill; includes portion of Ross Creek)
Canoas Creek
Vasona Reservoir
Ross Creek
Almaden Lake
Guadalupe Creek
Arroyo Calero
Alamitos Creek
Lexington Reservoir
Guadalupe Reservoir
Calero Reservoir
Almaden Reservoir
Guadalupe Creek Restoration Project
Lake Elsman
N
Not to Scale

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Figure 1-1. Guadalupe River Watershed Including Project Construction Areas

project area are also currently discharged into the lower Guadalupe River, adding to the volume of runoff.

Since 1940, there have been 10 noteworthy floods, the most recent ones in 1982, 1983, 1986, 1995, and 1998. The March 1995 flood was the largest, with instantaneous peak discharge (i.e., outflow rate) of 310 cms (11,000 cfs) at the Guadalupe gaging station, downstream of Los Gatos Creek. Because of the lower Guadalupe River's historical flooding potential, several flood-control projects have been implemented since the 1940s. In 1963, the historical river channel was modified in the "central zone" (an area encompassing the lower Guadalupe River). The modified channel, designed to convey a peak flood discharge of 340 cms (12,000 cfs), consisted of a trapezoidal cross section with benches between the main channel and the constructed levees. In 1983, the District again improved the lower Guadalupe River channel by raising and setting back levees, excavating channels in the overbank (between the low-flow channel and new levee toes), and recommending maintenance to the design cross section of the channel (Santa Clara Valley Water District 1982). The 1983 improvements were designed to convey a peak flood discharge of 481 cms (17,000 cfs) from U.S. 101 to the UPRR bridge. Implementation of a sediment maintenance plan began as part of this project. Subsequent channel maintenance activities varied from year to year until approximately 1992, when sediment management on the lower Guadalupe River was suspended because of regulatory limitations and concerns about biological effects. In 1995, the District raised the lower Guadalupe River levees at selected locations between the UPRR bridge and U.S. 101.

The current lower Guadalupe River is confined within flood-control levees. Both the low-flow and flood conveyance channels have been straightened and confined by the previous projects. As a result, the low-flow channel is incised throughout the reach, and sediment accumulates between the low-flow channel and the toe of the levees during annual high-flow events. Sediment deposition and vegetation growth in the channel have reduced the overall capacity of the lower Guadalupe River channel from its 1983 capacity of 481 cms (17,000 cfs) to approximately 400 cms (14,000 cfs). In addition, ground subsidence within the reach has altered the river's longitudinal slope. The lower end of the reach also has daily tidal inflow and outflow that extends upstream of Tasman Drive and results in tailwater effects on the riverflows. Fine sediments are deposited and hardened in these tidally influenced sections of the river, causing a continuing gradual decline in the river's hydraulic conveyance capacity.

To maintain as much channel capacity as possible, the District manages vegetation growth in portions of the lower Guadalupe River flood channel. Vegetation management activities since approximately 1993 have consisted mainly of hand labor and herbicide application on levees and portions of the channel overbank. (Approximately 6–32 hectares [14–80 acres] in lower Guadalupe River reaches have received this treatment annually since 1993.) As indicated above, no appreciable sediment management has been conducted in the lower Guadalupe River since 1992.

Current LGRP flood-control planning for the lower Guadalupe River has focused on restoring channel capacity to approximately 481 cms (17,000 cfs) to meet the terms of the District's Local Cooperative Agreement (LCA) with the Corps, which was signed in March 1992. Under the terms of the LCA, the District would operate and manage the lower Guadalupe River to provide the Corps design flood capacity. Inability to meet the LCA requirements could delay or jeopardize completion of the downtown Corps project. The LGRP was initiated as a District study after the lower Guadalupe River was found to have inadequate capacity to carry design floodflows from the 1995 storm events.

The lower Guadalupe River project was originally constructed in 1983, encompassing a reach from the UPRR bridge in Alviso to U.S. 101, to provide the Corps design floodflow capacity. Based on the data collected from the January and March 1995 storm events, a hydraulic analysis showed that this flood capacity was not provided. The analysis identified sediment deposition and vegetation growth as being the main causes of reduced in channel capacity.

In spring 1995, the District assembled an emergency project team to investigate options to restore the lower Guadalupe River's flood capacity in the interim period before completion of a comprehensive, multiobjective planning study and capital improvement project. An interim levee restoration project was constructed in summer 1995 to carry the Corps' design floodflow with 50% of the design freeboard.

The design flow rate shows an increase from 481 cms (17,000 cfs) at the upstream limit of the project to 565 cms (20,000 cfs) at the downstream limit. The upstream flow rate matches the rate being used for the design of the downtown Guadalupe River project, immediately upstream of the LGRP. Downstream increases in flow are based on estimates of existing and planned pump inflows.

Hydraulic analyses were conducted to determine the flow rate at which the lower Guadalupe River would overtop the levees along the various reaches. It was determined that flows of approximately 400 cms (14,000 cfs) would overtop the existing levees between Tasman Drive and Montague Expressway. Downstream of Tasman Drive, the river would overtop the levees at flow rates of approximately 481 cms (17,000 cfs). Upstream of Montague Expressway, the overflow capacity gradually increases to 425 cms (15,000 cfs) and to 566 cms (20,000 cfs) between each of the successive upstream reaches.

The downtown Guadalupe River project is scheduled to be completed by 2004. Once the downtown project is completed, peak floodflows would be able to pass in greater volume to the lower Guadalupe River. Because the lower Guadalupe River currently cannot convey the expected design flood event, floodway modifications would be designed and constructed to ensure that the channel improvements are operated and managed to convey the design floodflow with a peak of 481 cms (17,000 cfs) at Alviso.

LGRP planning also included a reconnaissance-level investigation of an Alviso baylands study area downstream of the UPRR bridge. The Alviso baylands investigation confirmed that this study area is subject to flooding from several sources other than the lower Guadalupe River, including the lower sections of Coyote Creek, Guadalupe Slough, and the extreme tide/storm surge events in south San Francisco Bay.

Purpose of and Need for the Project

The purpose of the LGRP is to provide improved flood protection for residents and businesses in San Jose and Santa Clara that are located in the floodplain of the lower Guadalupe River. The project would be consistent with the objectives described below.

The District signed an LCA with the Corps that provided for the District to operate and manage the lower Guadalupe River to convey the design flood event with a peak flow of 481 cms (17,000 cfs). The District must also implement LGRP improvements before completing the upstream flood-control improvements in the downtown reach of the river.

The District needs additional flood capacity in the lower Guadalupe River because it does not have the ability to convey the Corps' design flood event with a peak flow of 481 cms (17,000 cfs). The District must also implement LGRP improvements before completing the upstream flood-control improvements in the Downtown Project of the Guadalupe River to ensure that floodflows in the upper reaches can be carried through the lower Guadalupe River reaches. The need for LGRP improvements is also well substantiated by historical flooding and flood damage and hazards in San Jose and Santa Clara. Flooding has inundated as many as 2,104 hectares (5,200 acres) during the most severe floods (Santa Clara Valley Water District 1999). River flooding has caused bank erosion, debris accumulation, sediment deposition, and damage to homes, businesses, roadways, bridges, and other facilities. A design floodflow without the Downtown Project and the LGRP would inundate approximately 3,273 residential units, 951 commercial and industrial properties, and 66 public structures. Approximately 4,290 buildings would be flooded; flood damages are estimated at $560 million.

Project Objectives

The following primary objectives were developed by the District and were used to develop alternative plans for the project. The proposed alternatives are considered consistent with the project objectives.

- Provide channel capacity in the lower Guadalupe River to safely carry the floodwaters to be contained by the downtown improvement in accordance with the terms of the Corps LCA.
- Reduce bank erosion and sedimentation-related impacts along the lower Guadalupe River.
- Avoid potential adverse impacts on fish and wildlife habitats.
- Minimize impacts on the creek's environmental resources and restore some of the lost historical functions and value of the riparian corridor where feasible.
- Provide long-term riparian habitat improvement to offset impacts that result from the construction of flood-control facilities.
- Provide mitigation of unavoidable adverse impacts on environmental resources.
- Provide opportunities to protect and enhance the existing wetlands and riparian habitat, and improve conditions favoring chinook salmon and steelhead trout.
- Provide, where possible, a continuous maintenance access along the river that could be used as a future pedestrian trail extension.
- Identify potential project impacts on Alviso and bayland areas and mitigate significant impacts.
- Specify best management practices (BMPs) to protect water quality.

Required Permits and Approvals

In addition to complying with the requirements of CEQA, the LGRP must fulfill other environmental requirements. These federal, state, regional, and local requirements are described and summarized below.

Federal Requirements

National Environmental Policy Act

NEPA (42 U.S. Government Code [USC] 4321; 40 Code of Federal Regulations [CFR] 1500.1) is the nation's broadest environmental law. It applies to all federal agencies and most of the activities they manage, regulate, or fund that affect the environment. NEPA requires all federal agencies to disclose and consider the environmental implications of their proposed actions. It establishes environmental policies for the nation, provides an interdisciplinary framework for federal agencies to prevent environmental damage, and contains "action-forcing" procedures to ensure that federal agency decision makers take environmental factors into account.

NEPA requires the preparation of an appropriate document to ensure that federal agencies accomplish the law's purposes. The President's Council on Environmental Quality (CEQ) has adopted regulations and other guidance that provide detailed procedures that federal agencies must follow to implement NEPA. The Corps will use the District's EIR as the basis for complying with CEQ's regulations and to document NEPA compliance for CWA permitting.

Endangered Species Act

Section 7 of the federal Endangered Species Act (ESA) of 1973, as amended (16 USC 1531), requires federal agencies to consult with the Secretary of the Interior (U.S. Fish and Wildlife Service [USFWS]) and with the Secretary of Commerce (National Marine Fisheries Service [NMFS]) to ensure that agency actions do not jeopardize the continued existence of species federally listed endangered or threatened, or destroy or adversely modify designated critical habitat that supports such species.

Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) establishes a management system for national marine and estuarine fishery resources. This legislation requires that all federal agencies consult with NMFS regarding all actions or proposed actions permitted, funded, or undertaken that may adversely affect essential fish habitat (EFH). EFH is defined as "waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The legislation states that migratory routes to and from anadromous-fish spawning grounds should also be considered EFH. The phrase *adversely affect* refers to the creation of any impact that reduces the quality or quantity of EFH. Federal activities that take place outside an EFH but that may, nonetheless, have an impact on EFH waters and substrate must also be considered in the consultation process. Under the Magnuson-Stevens Act, effects on habitat managed under the Pacific Salmon Fishery Management Plan must also be considered.

The Magnuson-Stevens Act states that consultation regarding EFH should be consolidated, where appropriate, with the interagency consultation, coordination, and environmental review procedures required by other federal statutes, such as NEPA, the Fish and Wildlife Coordination Act (FWCA), the CWA, and ESA. In most cases, the environmental compliance required for federal activities will satisfy consultation requirements under the Magnuson-Stevens Act. EFH consultation requirements can be satisfied through concurrent environmental compliance requirements if the federal lead agency provides NMFS with timely notification of actions that may adversely affect EFH and if the notification meets requirements for EFH assessments.

Fish and Wildlife Coordination Act

The FWCA (16 USC 661 *et seq.*) requires federal agencies to consult with USFWS or, in some instances, with NMFS, and with state fish and wildlife resource agencies before undertaking or approving water projects that control or modify surface water. The purpose of this consultation is to ensure that wildlife concerns receive equal consideration with water resource development project objectives and that provisions for wildlife are incorporated into the features of these projects. The consultation process is intended to promote the conservation of fish and wildlife resources by preventing their loss or damage and provide for the development and improvement of fish and wildlife resources in connection with water projects. Federal agencies undertaking water projects are required to fully consider the recommendations made by USFWS, NMFS, and state fish and wildlife resources agencies in project reports, such as documents prepared to comply with CEQA and NEPA. They must also include measures to reduce significant impacts on wildlife in project plans.

Clean Water Act and River and Harbors Act

Section 404 of the CWA requires that a Corps permit be obtained for the discharge of dredged and fill material into waters of the United States, including wetlands. *Fill* is defined as any material used to convert an aquatic area to dry land or to change the bottom elevation of a water body. Section 10 of the Rivers and Harbors Act of 1899 requires a Department of the Army permit for structures and/or work in or affecting navigable waters of the United States. For projects that include activities regulated under both Section 404 and Section 10, the Corps combines the requirements of both acts into a single permit process.

The limit of the Corps' Section 404 permit jurisdiction is as follows:

- **Nontidal waters.** In the absence of adjacent wetlands, jurisdiction extends to the ordinary high-water mark; when wetlands are adjacent, jurisdiction extends beyond the ordinary high-water mark to the upper limit of the adjacent wetlands (as officially determined by the Corps). When the waters of the United States consist only of wetlands, jurisdiction extends to the limit of the wetland.
- **Tidal waters.** Jurisdiction extends to the high-tide line; when wetlands or nontidal waters of the United States are adjacent, jurisdiction extends to the limit of those waters as described above.

The *ordinary high-water mark* is defined as

> the line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.

The *high-tide line* is defined as "the line of intersection of the land with the water's surface at the maximum height reached by a rising tide." This line can be determined by physical markings or characteristics, vegetation lines, tidal gages, or other means that determine the general height reached by the rising tide. The high-tide line includes spring high tides and other high tides that occur with periodic frequency, but it does not include storm surges caused by hurricanes or other intense storms.

The lowermost reach of the Guadalupe River is subject to the ebb and flow of the tide and is therefore regulated under Section 10 of the Rivers and Harbors Act and Section 404 of the CWA. Any activity in this lower reach that may affect the river's navigable capacity would require a permit from the Corps. For the remainder of the LGRP, activities that include the discharge of dredged and fill material would require a Corps permit. Examples of such discharge activities include channel grading, excavation activities that result in a discharge of dredged material, placement of structures that have the effect of fill, placement of riprap, and channel realignment.

Under Section 401 of the CWA, applicants for a federal license or permit to conduct activities that may result in a discharge of a pollutant into waters of the United States must obtain certification from the state in which the discharge would originate, or, if appropriate, from the interstate water pollution control agency with jurisdiction over the affected waters at the point where the discharge would originate. For the LGRP, Section 401 certification must be obtained from the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB). The Corps permit will not be valid until the Section 401 certification is issued.

Clean Air Act

National ambient air quality standards (NAAQS) were established in 1970 by the federal Clean Air Act (CAA) for 6 pollutants: carbon monoxide, ozone, particulate matter, nitrogen dioxide, sulfur dioxide, and lead. Areas that do not meet the ambient air quality standards are called *nonattainment areas*. The CAA requires states to submit a state implementation plan (SIP) for nonattainment areas. The SIP, which is reviewed and approved by the U.S. Environmental Protection Agency (EPA), must delineate how the federal standards would be met. States that fail to submit a plan or to secure approval may be denied federal funding and/or required to increase emissions offsets for industrial expansion. The 1990 amendments to the CAA established categories of air pollution severity for nonattainment areas, ranging from marginal to extreme. SIP requirements vary, depending on the degree of severity.

The conformity provisions of the CAA are designed to ensure that federal agencies contribute to efforts to achieve NAAQS. EPA has issued 2 regulations implementing these provisions. The general conformity regulation addresses the actions of federal agencies other than the Federal Highway Administration and the Federal Transit Administration. General conformity applies to a wide range of actions or approvals by federal agencies. Projects are subject to general conformity if they exceed the emissions thresholds set in the rule and if they are not specifically exempted by the regulation. Such projects are required to fully offset or mitigate the emissions caused by the action, including both direct and indirect emissions over which the federal agency has some control.

The Corps has determined that a conformity analysis is not required for the LGRP because emissions of reactive organic gases (ROG) and oxides of nitrogen (NO_X) would be below the conformity thresholds of 55 metric tons (50 tons) of ROG and 110 metric tons (100 tons) of NO_X per year.

National Historic Preservation Act

The National Historic Preservation Act (NHPA) of 1966, as amended, requires federal agencies to take into account the effects of a proposed undertaking on cultural resources listed or eligible for listing on the National Register of Historic Places (NRHP). Because historic properties could be affected by the LGRP, the Corps is complying with Section 106 of the NHPA. Section 106 requires federal agencies or agencies for which they provide funding or issue permits to take into account the effects of their actions on properties that may be eligible for listing or that are listed in the NRHP.

The Section 106 review process consists of 4 steps:

- identifying and evaluating historic properties,
- assessing the effects of the undertaking on properties that are eligible for listing in the NRHP,
- consulting with the California State Historic Preservation Officer (SHPO) and appropriate agencies to develop an agreement addressing the treatment of historic properties, and
- receiving comments from the Advisory Council on Historic Preservation (ACHP) on the agreement or the results of consultation.

Once these steps are completed, the LGRP would proceed in accordance with the conditions of the agreement.

Executive Order 11988: *Floodplain Management*

Executive Order 11988 requires federal agencies to recognize the significant values of floodplains and to consider the public benefits that would be realized from restoring and preserving them. Under this order, the Corps is required to provide leadership and to take action to accomplish the objectives listed below.

- Avoid development in the base floodplain, unless such development is the only practicable alternative.
- Reduce the hazard and risk associated with floods.
- Minimize the impact of floods on human safety, health, and welfare.
- Restore and preserve the natural and beneficial values of the base floodplain.

Executive Order 11990: *Protection of Wetlands*

Executive Order 11990 directs federal agencies, in carrying out their responsibilities, to provide leadership to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance their natural and beneficial values. This policy states that federal agencies should avoid, to the extent possible, the long- and short-term adverse impacts associated with destruction or modification of wetlands. It also states that an agency should avoid undertaking and providing support for new construction in wetlands, including draining, dredging, channelizing, filling, diking, impounding, and other related activities, unless the agency finds that there are no practicable alternatives and all practical measures have been taken to minimize harm to wetlands.

Executive Order 12898: *Environmental Justice*

Executive Order 12898: *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations* requires each federal agency to identify and address any disproportionately high and adverse human-health or environmental effects of its actions on minority and low-income populations.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) (16 USC 703 *et seq.*) implements various treaties and conventions between the U.S., Canada, Japan, Mexico, and Russia, and provides protection for migratory birds, as defined in 16 USC 715j. The MBTA makes it unlawful for any "person" to take, kill, capture, collect, possess, buy, sell, trade, ship, import, or export any migratory bird, including feathers, parts, nests, or eggs. The MBTA does not protect the habitat of migratory birds. Violations of the MBTA are considered criminal offenses.

Case law from 1977 holds that federal agencies are not considered persons under the MBTA and are considered exempt from its provisions; therefore, the provisions of the MBTA do not regulate Corps activities.

The executive order *Responsibilities of Federal Agencies to Protect Migratory Birds* (Clinton, January 11, 2001) requires federal agencies that take actions that have, or are likely to have, a measurable negative effect on migratory bird populations to develop and implement, within 2 years, a memorandum of understanding (MOU) with USFWS that will promote the conservation of migratory bird populations. The protocols developed by this consultation are intended to guide future agency regulatory actions and policy decisions; renewal of permits, contracts or other agreements; and the creation of or revisions to land management plans. In addition to avoiding or minimizing impacts on migratory bird populations, agencies will be expected to take reasonable steps that include restoring and enhancing habitat, preventing or abating pollution affecting birds, and incorporating migratory bird conservation into agency planning processes whenever possible.

The executive order will serve to enhance coordination and communication among federal agencies and build on the progress that has been made in recent years on conservation of migratory birds. For example, the executive order will help agencies incorporate existing national planning efforts for bird conservation into their programs, and provide the formal presidential guidance necessary for agencies to integrate migratory bird conservation more fully into their activities.

District activities continue to be regulated by the MBTA. The District is currently preparing guidelines to ensure that its activities are in compliance with the provisions of the MBTA. The guidelines would indicate that the District will protect migratory birds, nests, eggs, or young on District property.

Disabilities Regulations

The Americans with Disabilities Act (ADA), the Rehabilitation Act, and title II of the Architectural Barriers Act (ABA) require projects administered by state and local governments to provide program accessibility to persons with disabilities, as long as providing accessibility would not fundamentally change the purpose of the project. Section 504 of the Rehabilitation Act requires accessibility for persons with disabilities to any program or activity receiving federal financial assistance. The ABA requires accessibility for persons with disabilities to federally financed facilities constructed or altered on behalf of the United States.

To conform with the ADA, the Rehabilitation Act, and the ABA, the District and the Corps have ensured that the recreation/open-space amenities incorporated into the LGRP adhere to the construction guidelines of the Uniform Federal Accessibility Standards. In addition, the District and the Corps have taken into consideration the regulations for outdoor recreational facilities that have been proposed for incorporation into the *ADA Accessibility Guidelines.*

State Requirements

California Environmental Quality Act

CEQA (Public Resource [Pub. Res.] Code 21000 *et seq.*) is regarded as the foundation of environmental law and policy in California. CEQA's primary objectives are as follows.

- Disclose to decision makers and the public the significant environmental effects of proposed activities.
- Identify ways to avoid or reduce environmental damage.
- Prevent environmental damage by requiring implementation of feasible alternatives or mitigation measures.
- Disclose to the public the reasons for agency approval of projects with significant environmental effects.
- Foster interagency coordination in the review of projects.
- Enhance public participation in the planning process.

Unless an exemption applies, CEQA applies to all discretionary activities proposed to be carried out or approved by California public agencies, including state, regional, county, and local agencies. CEQA requires that public agencies comply with both procedural and substantive requirements. Procedural requirements include the preparation of the appropriate environmental documentation and, where appropriate, mitigation measures, alternatives, mitigation monitoring, findings, statements of overriding considerations, public notices, responses to comments, legal enforcement procedures, citizen access to the courts, notice of preparation, agency consultation, and State Clearinghouse review.

CEQA's substantive provisions require that agencies address significant environmental impacts, to be disclosed in an appropriate document. When avoiding or minimizing significant environmental damage is not feasible, CEQA requires agencies to prepare a written statement of overriding considerations when they decide to approve a project that would cause 1 or more significant effects on the environment. CEQA establishes a series of action-forcing procedures to ensure that agencies adhere to the spirit of the law. Under the direction of CEQA, the California Resources Agency has also adopted regulations, known as the State CEQA Guidelines, that provide detailed procedures for agencies to follow to implement the law. The District will use this EIR to comply with the State CEQA Guidelines and to document CEQA compliance.

California Endangered Species Act

The California ESA is similar to the federal ESA. Listing decisions are made by the California Fish and Game Commission. All state agencies are required to consult with the California Department of Fish and Game (DFG) about projects that affect state-listed species. DFG is required to render an opinion as to whether a proposed project would jeopardize a listed species and to offer alternatives to avoid jeopardy. State agencies must adopt reasonable alternatives unless there are overriding social or economic conditions that make such alternatives infeasible. For projects causing incidental take, DFG is required to specify reasonable and prudent measures to minimize take. Any take that results from activities that are carried out in compliance with these measures is not prohibited.

Many California species are both federally and state listed. The California ESA directs DFG to coordinate with USFWS and NMFS in the consultation process so that consistent and comparable opinions or findings can be adopted by both federal and state agencies.

California Fish and Game Code (Section 1600 Lake or Streambed Alteration Agreement Program)

DFG regulates work that would substantially affect resources associated with rivers, streams, and lakes in California, pursuant to Fish and Game Code Sections 1600-1607. Under Section 1601 of the Fish and Game Code, any state or local governmental agency or public utility must notify the department if it proposes to:

- divert, obstruct, or change the natural flow or bed, channel, or bank of any river, stream, or lake designated by the department, in which there is at any time an existing fish or wildlife resource, or from which these resources derive benefit;
- use materials from the streambeds designated by the department; or
- dispose or deposit debris, waste, or other materials containing crumbled, flaked, or ground pavement where it can pass into any river, stream, or lake designated by the department.

Any person, governmental agency, or public utility that proposes any activity that would divert or obstruct the natural flow or change the bed, channel, or bank of any river, stream, or lake, or that proposes to use any material from a streambed, must first notify DFG of such proposed activity. This notification requirement applies to any work undertaken within the 100-year floodplain of a body of water or its tributaries, including intermittent streams and desert washes. In practice, however, the notification requirement generally applies to any work in the riparian corridor of a wash, stream, or lake that contains or once contained fish and wildlife, or supports or once supported riparian vegetation.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act is California's comprehensive water quality control law and is a complete regulatory program designed to protect water quality and the beneficial uses of the state's waters. The act requires adoption of water quality control plans by the state's 9 regional water quality control boards (RWQCBs). These plans are subject to approval from the State Water Resources Control Board (SWRCB), and ultimately EPA.

The primary method of implementing the plans is to require each discharger of waste that could affect the waters of the state to meet formal waste discharge requirements. Anyone discharging waste or proposing to discharge waste into the state's waters must file a "report of waste discharge" with the RWQCB. Those failing to file a report on discharges are subject to a wide variety of actions under administrative, civil, and criminal laws. After a report is filed, the RWQCB may issue waste discharge requirements that impose conditions on the discharge. The waste discharge requirements must be consistent with the water quality control plan for the body of water and protect the beneficial uses of the receiving waters. The RWQCBs also implement Section 402 of the CWA, which allows the state to issue a single discharge permit for the purposes of both federal and state law.

California Department of Transportation Encroachment Permit

The California Department of Transportation (Caltrans) is responsible for planning, designing, constructing, operating, and maintaining state-owned roadways. Caltrans issues permits for projects affecting the rights-of-way (ROWs) of state-owned roadways. The agency issues permits for encroachments on land within its jurisdiction to ensure that any proposed encroachment is compatible with the primary uses of the state highway system, to ensure the safety of both the permittee and the highway user, and to protect the state's investment in the highway facility.

An encroachment permit is required for actions proposed within, under, or over a state highway ROW, such as

- rerouting and protecting infrastructure;
- opening or excavating a state highway for any purpose;
- constructing and maintaining road approaches or connections to a ROW;
- grading within the ROW on any state highway; or
- placing, changing, or renewing an encroachment.

An encroachment requiring permanent access or maintenance within a freeway or expressway ROW can be considered for a permit only if the following restrictions are met.

- The encroachment is related to a public facility or to a utility dedicated to public use.
- Alternative locations for the encroachment are inordinately difficult or unreasonably costly.
- The encroachment is as near as possible to the outer boundary of the ROW.

When federal facilities or funds are affected, the encroachment is approved by the chief of the Caltrans Office of Project Planning and Design, and possibly also by the Federal Highway Administration. The District is responsible for purchasing lands, overseeing easements, and providing ROWs for the LGRP. In addition, the District is responsible for securing a cooperative agreement with Caltrans for activities within the Caltrans ROW.

Regional and Local Requirements

San Francisco Bay Regional Water Quality Control Board and State Water Resources Control Board

The SWRCB and SFBRWQCB establish policies and procedures that are designed to ensure the protection of surface water and groundwater from degradation. The SFBRWQCB establishes beneficial uses of surface water and groundwater resources, along with narrative and numerical water quality objectives to protect those uses, in its *Water Quality Control Plan for the San Francisco Bay Basin* (SFBRWQCB 1995). Under the CWA, SFBRWQCB administers the National Pollutant Discharge Elimination System (NPDES) permitting and Section 401 water quality certification processes.

Under the authority of Section 303(d) of the CWA, the SFBRWQCB and SWRCB list bodies of water as impaired when not in compliance with designated water quality objectives and standards. Section 303(d) also requires preparation of a total maximum daily load (TMDL) program for waters identified by the state as impaired. A TMDL is a quantitative assessment of a problem that affects water quality. The problem can include the presence of pollutants, such as sediments, heavy metals, or pesticides, or a change in a physical property of the water, such as dissolved oxygen or the temperature. A TMDL establishes the amount of a pollutant present in a body of water and specifies an allowable load of the pollutant from individual sources to ensure compliance with water quality standards. Once the allowable load and the existing source loads have been determined, reductions in allowable loads are allocated to the individual sources.

San Francisco Bay Conservation and Development Commission

The 27-member San Francisco Bay Conservation and Development Commission (BCDC) was created by the California Legislature in 1965 in response to broad public concern about the future of San Francisco Bay. The BCDC is charged with

- regulating all filling and dredging in San Francisco Bay (which includes San Pablo and Suisun Bays, sloughs and certain creeks and tributaries that are part of the bay system, salt ponds, and certain other areas that have been diked off from the bay);

- protecting Suisun Marsh, the largest remaining wetland in California, by administering the Suisun Marsh Preservation Act in cooperation with local governments;
- regulating new development within the first 30.5 meters (m) (100 feet) inland from the bay to ensure that maximum feasible public access to the bay is provided;
- minimizing pressures to fill the bay by ensuring that the limited amount of shoreline area suitable for high-priority water-oriented uses is reserved for ports, water-related industries, water-oriented recreation, airports, and wildlife areas;
- pursuing an active planning program to study bay issues so that BCDC plans and policies are based on the best available current information;
- administering the federal Coastal Zone Management Act (CZMA) within the San Francisco Bay segment of the California coastal zone to ensure that federal activities reflect BCDC policies;
- participating in the regionwide state and federal program to prepare a long-term management strategy (LTMS) for dredging and dredge material disposal in San Francisco Bay; and
- participating in California's oil spill prevention and response planning program.

Stream Maintenance Program

The District's Stream Maintenance Program (SMP) would provide long-term guidance to effectively implement routine stream maintenance projects in a cost-effective and environmentally sensitive manner (Santa Clara Valley Water District 2001a). The SMP report is a process and policy document that would be used in obtaining long-term permits for routine stream maintenance activities. The SMP addresses all routine stream maintenance activities, such as sediment removal, vegetation management, and bank protection, within the District's jurisdiction, including the LGRP area. The SMP is not yet an approved program, and it would not be implemented until after a program EIR and ESA compliance have been completed and all necessary permits obtained.

Proposed mitigation of potential adverse environmental effects associated with the SMP includes

- adopting policies, implementation measures, and BMPs, organized by type of activity and designed to avoid and minimize impacts;

- providing compensatory mitigation through restoration and preservation; and
- mitigating for potential impacts on sensitive species.

A proposed compensatory mitigation package for significant residual impacts of the SMP includes

- watershed and habitat protection through preservation of existing high-quality habitat, primarily in upper watershed areas;
- restoration of riparian habitat through removal of nonnative pest plants and riparian revegetation, primarily in mid-watershed areas;
- restoration and protection of tidal wetlands in the lower watershed; and
- creation of nontidal wetlands. (Santa Clara Valley Water District 2001a.)

City of San Jose Tree Ordinance

The City of San Jose (City) protects trees with a diameter at breast height (dbh) greater than 45.7 centimeters (cm) (18 inches) under the City's tree ordinance. Trees with a dbh greater than 45.7 cm (18 inches) are considered ordinance trees. In addition, the city council identifies heritage trees as those ordinance trees that have a special significance to the community because of their history, girth, height, species, unique quality, or other factors (San Jose Code chapter 13.28). For trees outside of Corps and/or District property, the Corps and the District would consult with the City arborist to obtain a tree-removal permit and to meet City mitigation requirements for the loss of ordinance trees resulting from the LGRP. At such time, a determination would be made as to whether mitigation requirements are necessary to mitigate the loss of ordinance trees.

Organization of the Environmental Impact Report

This document has been organized to comply with the requirements and guidelines of CEQA and to provide decision makers with a description of the project, its impacts, and suggested mitigation measures. The report is organized into the following chapters.

- Chapter 1, "Purpose of and Need for the Project," provides an overview of the project history and background, the need for the LGRP, project objectives, and a list of permits and approvals needed.
- Chapter 2, "Proposed Project and Alternatives," describes the Proposed Project and alternatives and documents the results of the alternatives screening process.

- Chapter 3, "Environmental Setting, Impacts, and Mitigation Measures," describes the environmental setting, presents the alternatives and the impact analysis for each resource area, and describes the mitigation measures proposed to reduce significant impacts to less-than-significant levels.
- Chapter 4, "Cumulative Impacts," contains an analysis of the cumulative impacts on LGRP area resources that are anticipated as a result of other projects in the area.
- Chapter 5, "Other Required Impact Analyses," presents other analyses required by CEQA, including evaluation of unavoidable adverse impacts, analysis of short-term versus long-term productivity and impacts, and presentation of irreversible and irretrievable commitment of resources.
- Chapter 6, "Agency and Public Involvement," summarizes the public outreach, agency coordination, and public scoping process undertaken to meet requirements for public disclosure and scoping.
- Chapter 7, "Mitigation and Monitoring Plan Summary," summarizes the mitigation and monitoring program that the District would develop to ensure that mitigation measures are implemented.
- Chapter 8, "References Cited," includes a complete bibliography of documents cited.
- Chapter 9, "List of Preparers," contains a description of those involved in the preparation of this document.
- Appendices to this document are as follows:
    - Appendix A, "U.S. Army Corps of Engineers Letter on Environmental Impact Statement Requirement";
    - Appendix B, "Concentrations of Turbidity and Nutrients (Data)";
    - Appendix C, "Temperature Data and Modeling";
    - Appendix D, "Special-Status Plant and Wildlife Species with Potential to Occur in the LGRP Area";
    - Appendix E, "Alviso Baylands Biological Resources Evaluation";
    - Appendix F, "Downtown Guadalupe River Cumulative Impact Analyses (February 2001)";
    - Appendix G, "Vegetation Mapping";
    - Appendix H, "U.S. Army Corps of Engineers Letter Regarding Local Cooperation Agreement" (May 15, 2002);

- Appendix I, "CH2M Hill Memorandum Regarding Existing Levees within the LGRP" (April 25, 2002); and
- Appendix J, "Technical Memorandum, Evaluation of Effects of Interior Drainage Flows on LGR Hydraulic Conditions (*to follow*).

Chapter 2

Proposed Project and Alternatives

Summary of Alternatives Screening Process

The LGRP investigation included a comprehensive process for screening alternatives. The full text of the screening analysis is presented in chapter 4 of the Engineer's Report. The objective of the alternatives analysis is to identify alternatives that meet the basic project purpose, can be implemented within the project schedule and at reasonable capital and long-term cost, and meet the project objectives listed in chapter 1, "Purpose of and Need for the Project." During the screening process, flood-control solutions that require the minimum modification necessary to solve the problem were preferred.

A part of the alternatives screening process, input from the public, was considered during 3 project open houses, a public scoping meeting, and 3 agency coordination meetings. The purpose of these meetings was to inform the public and resource agency staff about progress on the LGRP, and to solicit comments from individuals on the range of alternatives that should be considered and the desired contents of the draft document. Comments received at public meetings and included in comment letters from public agencies and individuals during the scoping process were recorded (see chapter 6, "Agency and Public Involvement").

Specific and consistent criteria were developed to screen the alternatives and determine which practical alternatives would meet the project purpose. The screening criteria included consideration of an alternative's

- ability to meet the project purpose and objectives,
- capacity for implementation in a reasonable time period,
- capital and maintenance costs,

- environmental effects,
- technical and operational feasibility, and
- perceived public use.

Screening criteria are defined in detail in chapter 4 of the Engineer's Report. Each alternative was also evaluated for consistency with policy. A tiered approach to the alternatives analysis was used. The alternatives were analyzed in 3 stages.

Stage-1 Evaluation

In the first stage, alternatives were analyzed to determine which ones would not reasonably meet the overall project purpose, separately or in combination with other alternatives. Stage 1 was used to evaluate conceptual project alternatives or strategies. A comprehensive range of potential solutions was considered to address flood control on the lower Guadalupe River. Alternative design concepts ranged from watershed-oriented solutions that would involve increasing flood storage capacity in upstream reservoirs to more traditional in-channel capacity modifications. The screening criteria were not applied in detail during this stage, ensuring that generally described alternatives that lacked detailed information were not unfairly removed from consideration. The following alternative concepts were evaluated during stage-1 screening:

- the No-Project Alternative (i.e., no new structural or nonstructural flood protection);
- a nonstructural alternative (i.e., floodproofing structures or purchase and removal of structures);
- upstream floodwater storage alternatives (i.e., modifications to New Guadalupe Dam, Hooker Dam, and Lenihan Dam);
- alternatives involving changes in upstream reservoir operations (i.e., modifying operations of Lenihan Dam for flood protection and water supply);
- a watershed transfer alternative (i.e., transfer of Guadalupe River floodflows to the Coyote Creek watershed);
- offstream storage basin alternatives (i.e., offstream storage sites adjacent to the Guadalupe River);

- channel bank modification alternatives (i.e., various bank modifications, levee raising, floodwalls, levee setbacks, bridge modifications, dredging, and sediment and vegetation management); and
- channel bypass alternatives (i.e., open or buried conveyance structures).

Stage-2 Evaluation

A second-stage evaluation was used to further define those flood-control concepts carried forward from the stage-1 evaluation and to determine whether those alternatives met the screening criteria. The stage-2 evaluation analyzed the ability of the alternatives to satisfy the project purpose in light of their environmental, technological, and cost-related feasibility. This stage was also used to distinguish elements of proposed flood-control solutions that may not meet the project objectives as stand-alone projects but that could be combined with other alternative components to create a viable alternative. Detailed analysis was required at this stage to identify clear and compelling reasons for rejecting possible alternatives (see chapter 4 of the Engineer's Report).

Stage-3 Evaluation

Alternatives that made it through stage-2 screening were scrutinized to compare their relative feasibility and to judge their appropriateness for evaluation in the EIR. Where appropriate, flood-control elements that were found to be impractical as stand-alone alternatives were combined with viable alternatives to present more comprehensive alternatives. The scope of this stage-3 evaluation was commensurate with, and a part of, the environmental impact evaluations completed for the EIR.

Alternative Screening Results

Stage-1 screening resulted in elimination of all the alternative concepts except the channel modification concepts and the channel bypass concepts. See "Alternatives Eliminated from Further Study" below for a discussion of alternatives that were eliminated from consideration in the EIR. Channel modification and channel bypass concepts were evaluated in further detail in stage-2 screening because these alternatives were shown to significantly lower the water surface elevations in the lower Guadalupe River; they would also meet the project purpose and objectives in a technically feasible manner and at a capital cost and timeframe consistent with LGRP goals.

Stage-2 screening of the channel modification and channel bypass concepts involved evaluating 9 specific alternatives:

- **Channel Bank Modification:** Excavating the inboard slope of the levees and constructing a vertical or near-vertical retaining wall along the exposed surface of the levee (see chapter 4 of the Engineer's Report for detailed descriptions of alternatives).
- **Levee Paving:** Lining the inboard levee surface from the levee hinge to the levee toe to decrease channel roughness.
- **Floodwalls:** Augmenting the existing levee height with reinforced concrete floodwalls.
- **Setback Levees:** Setting back the east and west levees approximately 20–50 m (65.6–164 feet) and considering a much larger setback to help the river reestablish geomorphological processes.
- **Bridge Crossing Modifications:** Raising or modifying bridges that create a substantial constriction in the channel.
- **Channel Excavation/Dredging:** Increasing the channel prism by dredging material inboard of the existing levee toes.
- **Sediment Management:** Excavating channel sediment to prevent sediment accumulation and increase channel capacity.
- **Vegetation Management:** Removing channel vegetation to reduce the roughness of the channel.
- **Channel Bypass:** Conveying up to 50% of the design floodflow in the channel in a bypass or bypasses located under existing levees.

Stage-2 screening resulted in narrowing the 10 alternatives to a short list of 4 action alternatives (plus the No-Project Alternative) that would be further scrutinized in stage-3 screening:

- the Channel Bank Modification Alternative,
- the Floodwalls/Levee Raise Alternative,
- the Channel Excavation/Dredging Alternative, and
- the Channel Bypass Alternative.

These alternatives were generally chosen because they met the design floodflow and cost criteria, could be considered stand-alone alternatives that meet project objectives, and generally could be constructed to meet environmental, technical, and public-use criteria.

The stage-2 analysis concluded that all 4 action alternatives would be carried forward to the stage-3 analysis. The Channel Bypass Alternative was included in the stage-3 analysis even though its capital cost and implementation time did not pass stage-2 screening. The Channel Excavation/Dredging Alternative was also evaluated in stage 3 and eliminated because of the need for substantial recurring maintenance costs, substantial wetland impacts, and failure to meet public-use criteria.

Based on a comparison of the relative ability of the short-listed alternatives to meet screening criteria, the No-Project Alternative, Floodwalls/Levee Raise Alternative, and Channel Bank Modification Alternative are evaluated at a similar level of detail in the draft EIR to provide a thorough evaluation of the 2 most feasible alternatives. Both action alternatives are found to exhibit the greatest balance between the need to provide feasible flood-control solutions on the lower Guadalupe River and the objective of completing the project in a manner that maintains and enhances river conditions for the benefit of District constituents. The EIR also evaluates the Channel Bypass Alternative because it was found to be only somewhat less feasible than the Floodwall/Levee Raise and the Channel Bank Modification Alternatives. See chapter 4 of the Engineer's Report and the "Project Alternatives" discussion below for a detailed project description of each of these alternatives.

Alternatives Eliminated From Further Study

A detailed discussion of the screening analysis results is presented in chapter 4 of the LGRP Engineer's Report. Alternatives that were considered and eliminated from further consideration during the 3-stage alternatives screening analysis are briefly discussed below.

Nonstructural Alternative

The Nonstructural Alternative would solve the problems caused by flooding of structures in the floodplain without requiring channel modifications. The structures subject to potential flood damage would be floodproofed or purchased and removed. Affected streets and public areas would still be subject to frequent flooding. This alternative would result in the need to relocate numerous residences and businesses. The need to acquire all potentially flooded structures makes this alternative prohibitively costly. Additionally, the alternative would not resolve the problems posed by frequent flooding in streets and public areas. Because this type of alternative does not meet the overall project purpose and does not meet other criteria for project feasibility, such as cost and timing criteria, it has been removed from further consideration.

Upstream Floodwater Storage Alternatives

The feasibility of providing new or modified upstream reservoirs and offstream storage basins was studied in the Upper Guadalupe River Engineer's Report and in the *Final Environmental Impact Report/Environmental Impact Statement for the Upper Guadalupe River Flood Control Project* (U.S. Army Corps of Engineers 2000). These previous analyses removed various possible flood storage options from consideration for the reasons listed below.

- **New Guadalupe Dam.** Construction of a new dam approximately 3.22 km (2 miles) downstream of the existing Guadalupe Dam was considered. The new dam would be 19.8 m (65 feet) high and have the capacity to capture the entire 100-year-flood hydrograph at that location. Analysis showed that the dam would not provide 100-year-flood protection farther downstream (along the Guadalupe River in downtown San Jose and the lower Guadalupe River) because of additional inflows between the dam and San Jose; therefore, this plan did not meet the LGRP design floodflow-conveyance criterion. The plan also did not meet the capital cost or the timing criteria for the LGRP. As a result, it was removed from further study.
- **Raising Lenihan Dam.** Raising Lenihan Dam by about 7.62 m (25 feet) to provide 15,000 acre-feet (af) of flood storage capacity was considered. Raising the dam would reduce 100-year flows in the Guadalupe River from 481 cms (17,000 cfs) to 310 cms (11,000 cfs). This alternative, therefore, meets the design criteria for conveying the design flows. Raising the dam would require the relocation of a water treatment plant and a state highway, however, and it may result in environmental impacts associated with inundation of existing habitats. Additionally, this alternative would not meet the timing criterion; it could take up to 10–15 years to complete. For these reasons, this alternative was eliminated from further consideration.
- **Hooker Dam.** Construction of a new dam upstream of Lenihan Dam was considered for the purpose of providing additional flood protection storage and increased flood protection for the Guadalupe River. The dam would be located midway between Lenihan and Austrian Dams. This plan was eliminated from further study because the drainage area tributary to the proposed facility would be only 44 km^2 (17 square miles) and would not provide the flood protection needed; therefore, it would not meet design criteria for the LGRP.

- **Change in Operation of Leniham Dam.** Changing operation of Lenihan Dam on Lexington Reservoir was considered for the dual purposes of flood protection and water supply. This would require lowering the water level before the flood season and would necessitate purchasing water from sources outside the watershed to make up for the estimated 7,000-af/year loss in water supply. The projected costs to purchase the lost water supply were about 3 times the average annual benefits, making this plan infeasible; therefore, this alternative would not meet the capital cost criterion for the LGRP.

Watershed Transfer Alternative

This alternative would involve diverting Guadalupe River floodwaters into the neighboring Coyote Creek watershed to reduce the peak flow rate in the channel. A maximum of 84.95 cms (3,000 cfs) would be transferred from the Guadalupe River to Coyote Creek. This alternative was evaluated briefly to consider the potential for diverting a portion of the lower Guadalupe River floodflow to a neighboring watershed to reduce the peak flow rate on the lower Guadalupe River. It was judged to not meet the objectives of the LGRP because a suitable discharge location is not available and water bodies adjacent to the Guadalupe River also experience flooding. Preliminary evaluation indicated that this alternative would not meet the design floodflow or capital cost criteria and that it would not be feasible as a "stand-alone" solution.

Offstream Storage Basin Alternative

For the Offstream Storage Basin Alternative, peak floodflows would be routed through a diversion structure into an offstream storage site, which would reduce the Guadalupe River peak flow rate. Floodwater storage capacities in excess of 2,000 af would be required. The offstream storage alternative is restricted by the availability of offstream storage sites. To be effective, the storage site would have to be located at the upstream end of the channel reach and have a minimum capacity of 2,000 af. Based on reconnaissance review of the project vicinity, no feasible offstream basin sites are available; therefore, this alternative was removed from further consideration.

Channel Modification Alternatives

Of the 8 channel modification concepts that were passed through the stage-1 screening, 6 alternatives were eliminated from further consideration because of specific failures to meet screening criteria.

Levee Paving

This option involves paving the inboard levee surface from the levee hinge to the levee toe to decrease channel roughness. These improvements would extend from U.S. 101 to the UPRR bridge crossing. This channel modification would not provide significantly increased hydraulic capacity in the downstream reaches of the LGRP, where capacity is most limited; therefore, this alternative would not meet the design floodflow criteria and could not be considered a "stand-alone" design concept that would meet the flood protection objective of the LGRP.

Channel Excavation/Dredging

This design concept consists of increasing the channel prism by dredging material inboard of the existing levee toes from approximately Montague Expressway to the UPRR crossing. An option to extend dredging downstream of the UPRR crossing to the Alviso Marina inlet was also considered as a tailwater lowering option. The channel would be dredged to create a trapezoid that has a base width of approximately 40 m (130 feet) and 2:1 side slopes. All wetland and riparian habitat would be removed and not allowed to reestablish. An objective of this design is to create enough conveyance in the channel so that no floodwall or levee raising would be necessary. The channel would be redredged periodically to maintain the project design capacity.

The dredging alternative was found to meet most of the design criteria by lowering the water surface elevation from Montague Expressway to Tasman Drive by up to 3 m (9.8 feet), avoiding construction of new facilities, and meeting the timing criterion; however, the recurring cost for maintenance of the dredged conditions over the 100-year life of the project has been judged to be prohibitive (up to approximately $80 million).

This alternative also would not meet environmental, jurisdictional, and some public-acceptance criteria. The alternative would not meet the acceptable-environmental-effects criterion and the environmental-enhancement criterion because of the loss of up to 20 hectares (50 acres) of wildlife, wetland, and shaded riverine aquatic (SRA) habitat from Montague Expressway to the

UPRR bridge. It has the potential for adverse effects on fish passage, depending on the method and depth of dredging, and could potentially affect known buried archaeological resources.

The dredging alternative could have positive effects related to sediment containing mercury or other hazardous materials, assuming that the cleanup of known areas is required during dredging activities. It would meet some of the public-acceptance criteria, such as implementing a relatively quick solution to flood-control and avoiding traffic disruptions and construction nuisances. However, this alternative was found to not meet public-acceptance criteria related to public access, aesthetics, and recreational opportunities because channel dredging would substantially change the flood-control channel from a currently well-vegetated environment with an established low-flow channel to a more channelized appearance with lower wildlife habitat values and less appeal for recreationists.

The dredging alternative was evaluated in the stage-3 screening process, but was ultimately eliminated from consideration for the reasons stated above.

Sediment Management

Under this alternative, a sediment-maintenance schedule would be developed to prevent sediment accumulation and increase channel capacity. The difference between this option and the channel excavation/dredging option is in the magnitude of sediment removed; less sediment would be removed under the sediment management alternative than under the channel excavation/dredging alternative.

A sediment management program that would excavate less sediment from the channel than would be excavated under the dredging alternative would not result in a "stand-alone" design concept that would meet the LGRP flood protection objective; therefore, this alternative would not meet the design-floodflow criterion. However, sediment management is recognized as an important LGRP design feature that would influence the size, type, and location of flood-control structures needed on the lower Guadalupe River.

Vegetation Management

This design concept includes intensive maintenance to remove channel vegetation to decrease channel roughness. A vegetation management program in the lower Guadalupe River would not result in a "stand-alone" design concept that would meet the LGRP flood protection objective; therefore, this alternative would not meet the design-floodflow criterion. However, combining vegetation management with sediment management is recognized as an important LGRP design assumption that would influence the size, type, and location of flood-control structures needed on the lower Guadalupe River.

Setback Levees

Under this alternative, levees along the east and west banks would be relocated outboard from the existing levee to provide increased channel capacity and freeboard. This concept would provide for the removal of the levees from their existing locations and construction of new levees approximately 20–50 m (65.6–164 feet) outward from the existing levees, thereby increasing the conveyance of the channel. Levee setbacks could also be used to reestablish the stability of the river and its historical floodplain. Under this fluvial geomorphological alternative, the river would be allowed to move (i.e., meander) within a wide corridor and would move sediment efficiently through the system without ongoing maintenance. Based on historic (1939) photographs of the lower Guadalupe River, reestablishing these geomorphological processes would require a meander belt for the river approximately 500 m (1,640 feet) wide.

Setting levees back by 20 m (65.6 feet) on the east or west side of the river from Montague Expressway to the UPRR bridge would substantially encroach on existing land uses and would require substantial land and property acquisition. Therefore, this alternative would not meet the capital cost criterion and would provide only slightly lower water surface elevations for this reach.

To be effective in meeting the flood protection objective, a setback of more than 50 m (164 feet) on both sides of the river would be required. This would require the purchase of approximately 20.23 hectares (50 acres) of occupied property and substantial relocation of homes, businesses, and public facilities. The property acquisition alone would cost approximately $100 million. Because of the extremely high property acquisition costs and the need to relocate a substantial number of businesses and residents, this alternative was eliminated from further consideration.

Modification of Bridge Crossings

This design concept would involve raising the lower Guadalupe River bridges and/or removing abutment slopes. The hydraulic benefit would be very slight for all bridges, other than the eastbound lanes of SR 237. The SR 237 bridge is considered as an alternative to, or along with, a bypass structure at the SR 237 bridge. This design concept alone does not meet the design-floodflow criterion of the LGRP and is not considered further as a stand-alone alternative.

Project Alternatives

Three LGRP action alternatives meet the flood-protection and other objectives of the project on the lower Guadalupe River between the I-880 crossing and the UPRR bridge. Alternatives would be designed to convey a floodflow of 481 cms (17,000 cfs). These alternatives represent a reasonable range of alternatives as required under CEQA. A No-Project Alternative is also considered to meet the requirements of CEQA, but it would not meet the project objective for flood control. Alternatives considered in this EIR are

- Alternative 1: No Project,
- Alternative 2: Floodwalls/Levee Raise,
- Alternative 3: Channel Bank Modification, and
- Alternative 4: Channel Bypass.

It was determined that Alternative 2, Floodwalls/Levee Raise, is the Proposed Project for purposes of this environmental review. The environmental impacts of Alternatives 1–3 are evaluated in similar detail to ensure that these 3 alternatives are considered more thoroughly than required under CEQA before a project is selected by the decision makers. Alternative 4 (Channel Bypass) is evaluated at a slightly lesser level of detail than Alternatives 1–3 because it is considered to be generally less feasible than Alternatives 2 and 3, but could result in improvement of some environmental conditions. The alternatives are focused on in-channel improvements within the LGRP limits, taking into consideration the potential floodflow impacts downstream of the project in and around Alviso Slough.

The main structural difference between Alternative 2, Floodwalls/Levee Raise, and Alternative 3, Channel Bank Modification, is that Alternative 2 primarily relies on raising existing levees and constructing floodwalls on levees to improve channel capacity and meet freeboard requirements, whereas Alternative 3, Channel Bank Modification, relies on excavation of the inboard toe of existing levees in reaches D–G and construction of mechanically stabilized earth (MSE) walls at the new channel bench to widen the existing channel and improve channel capacity.

For project planning purposes, the LGRP has been divided into 7 reaches to simplify the consideration of construction elements and discussion of environmental impacts. The 7 reaches (figure 2-1) are:

- reach A: I-880 to U.S. 101,
- reach B: U.S. 101 to Trimble Road,
- reach C: Trimble Road to Montague Expressway,
- reach D: Montague Expressway to the Hetch Hetchy Aqueduct,
- reach E: Hetch Hetchy Aqueduct to Tasman Drive,
- reach F: Tasman Drive to SR 237, and
- reach G: SR 237 to the UPRR bridge in Alviso.

The portion of reach A located upstream of Airport Parkway is coincident with a downstream reach of the downtown Guadalupe River project. This reach was also evaluated as part of the upper Guadalupe River project. For the purposes of the LGRP, the impacts of the flood-control features are assessed for the entire reach-A area. Although the Alviso baylands study area is outside the project area and is not considered part of the LGRP, the impacts of the Guadalupe River flows on this area are evaluated. This study area is defined as the portion of Alviso Slough downstream of the UPRR and areas adjacent to Alviso Slough including Cargill Salt Ponds A8D, A8W, A5, A7, New Chicago Marsh, and the town of Alviso. Please refer also to the baylands reconnaissance study (Northwest Hydraulic Consultants 2001) and the "Hydrologic and Hydraulic Conditions" section of chapter 3.

Since circulation of the Draft EIR for public review, the District has determined that the Proposed Project channel improvements that are designed to convey flows of approximately 17,000 cfs during the design flood event can also accommodate additional local drainage pump and outfall flow from City facilities that discharge to the lower Guadalupe River under cumulative conditions. The ability to accommodate this additional flow would eliminate the need to restrict local drainage pumping to the lower Guadalupe River during peak storm events. Details of that investigation and modeling assumptions used to add local drainage data to the LGRP hydraulic modeling are contained in *Technical Memorandum, Evaluation of Effects of Interior Drainage Flows on LGR Hydraulic Conditions* (Northwest Hydraulic Consultants 2002) (see appendix C).

The major pump stations and gravity outfalls in this area are estimated to contribute up to an additional 1,350 cfs of flow to the lower Guadalupe River beyond the 17,000 cfs design flood event flow assumed for the LGRP Proposed Project (Northwest Hydraulic Consultants 2002). Total channel flow under cumulative conditions is estimated to be approximately 18,350 cfs (Northwest Hydraulic Consultants 2002). Although the maximum

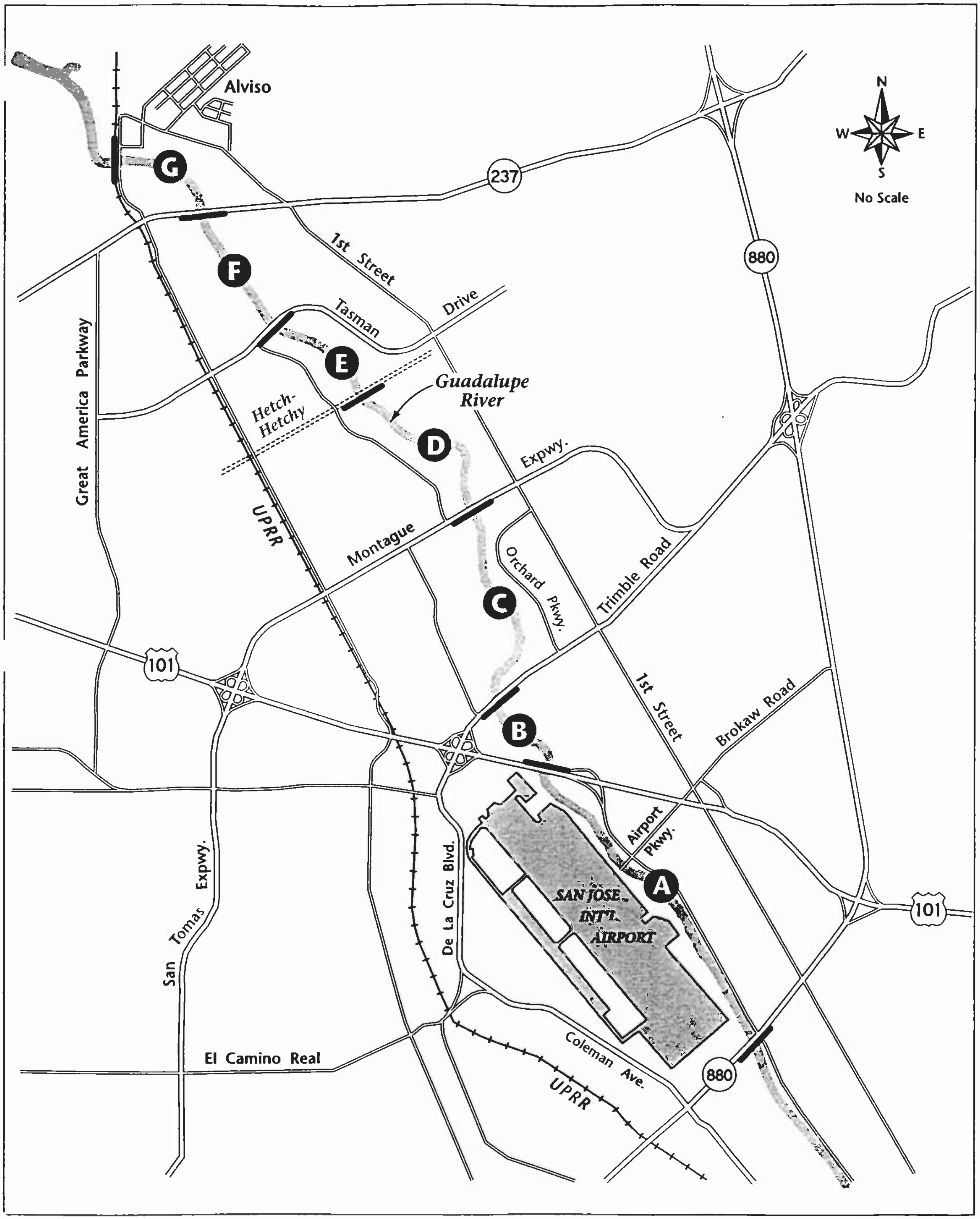

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Figure 2-1. Location Map Showing Lower Guadalupe River Reaches

channel flow that could be accommodated by the Proposed Project improvements is greater than the assumed 17,000 cfs flow, the objectives of the LGRP have not changed and none of the Proposed Project elements would need to be modified to accommodate this greater channel flow. Continuous operation of pumps and gravity outfalls during a design flood event on the lower Guadalupe River, including potential downstream impacts, is addressed fully in chapter 4, "Cumulative Impacts."

Alternative 1: No Project

CEQA requires a description and an analysis of a no-project alternative to allow decision makers to compare the impacts of approving a proposed project with the impacts of not approving a proposed project. The no-project alternative assumes existing conditions at the time that the Notice of Preparation (NOP) was circulated, which, for the LGRP, was April 19, 2000; it also assumes the conditions that would be expected to result in the foreseeable future if the Proposed Project were not approved. One of the consequences of Alternative 1, the No-Project Alternative, is that the upper and downtown Guadalupe River projects would not be allowed to operate and operational impacts associated with these projects would not occur. Because these upstream projects would not operate, substantial flooding would continue in downtown San Jose and Santa Clara.

The No-Project Alternative includes the following flood-control features:

- continuation of current routine vegetation and sediment management activities, and
- continuation of routine inspections and maintenance of levees and access roads.

Structural Features

No new structural features for flood control would be implemented under the No-Project Alternative.

Maintenance Features

The No-Project Alternative would include limited vegetation and sediment management that is currently performed on the lower Guadalupe River:

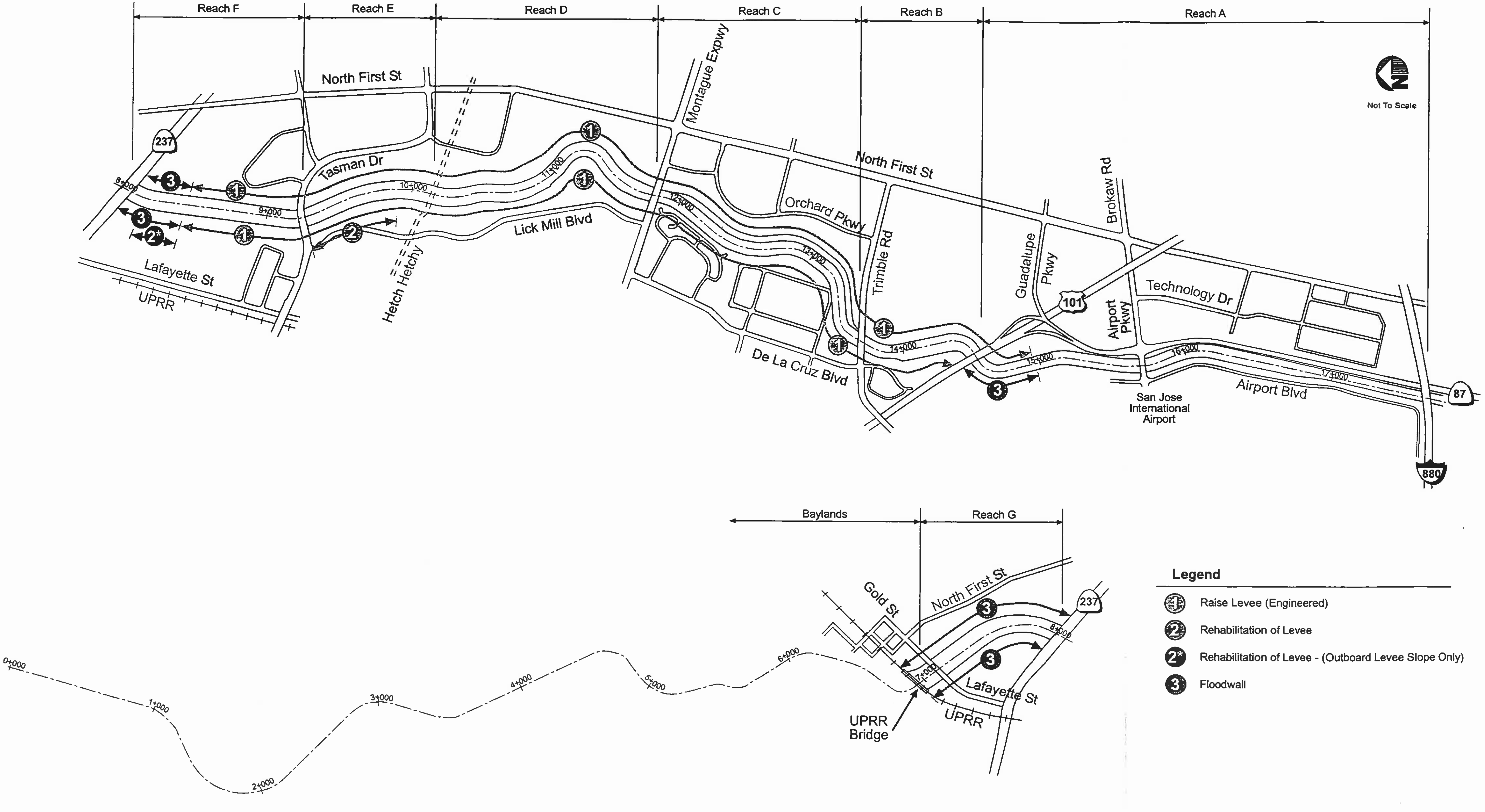
- **Sediment Management.** Sediment management under the No-Project Alternative would include only those sediment management activities that are currently performed that involve minor, periodic removal of sediment deposits in confined problem areas, such as those found at approaches to bridges, near flood-control and drainage facilities, on maintenance roads, or in other areas that would impede normal operation of flood-control facilities. It would include the removal of debris, rubbish, and other channel obstructions in reaches A–G. The No-Project Alternative would exclude past sediment management activities that occurred before 1992 in reaches B–E. Historical sediment management in these areas was intended to maintain the design capacity of previous flood-control projects and included substantial sediment excavation. These previous activities are not currently authorized and have not occurred for the past 9 years.

- **Vegetation Management.** Vegetation management under the No-Project Alternative would involve limited mechanical and chemical control of woody and aquatic vegetation in reaches A–E to maintain the current vegetative cover, avoid overgrowth in the channel, and limit the spread of new woody vegetation recruits. Limited vegetation management has been conducted in reaches F and G because of regulatory restrictions on vegetation removal in these areas. Vegetation management includes control of weeds and grasses and the removal of vegetation from maintenance roads, channel bottoms, and levee banks. It also includes some removal and control of woody or herbaceous vegetation in reaches B–E. Mechanical and chemical control of vegetation includes "spot" application of herbicides or localized removal of vegetation in new-growth areas or where vegetation would impede the function of flood-control facilities. Vegetation control in reach A is limited because of proposed Corps and Caltrans mitigation plantings in this area, but it would resume in areas outside the mitigation plantings once a mitigation framework is in place. Vegetation is typically removed by mowing, disking, hand labor, or herbicide application, and removal of sediment.
- **Levee Facility Maintenance.** Facility maintenance under the No-Project Alternative would include maintenance of levee and access roads, including routine inspections and minor repairs to access roads, drainage outfalls, and levee structures (e.g., filling holes and repairing slumping levee banks). Levee facility maintenance under the No-Project Alternative would not include major levee repairs such as clearing trees, removing expansive levee fill, and replacing areas with engineered fill.

Alternative 2: Floodwalls/Levee Raise (Proposed Project)

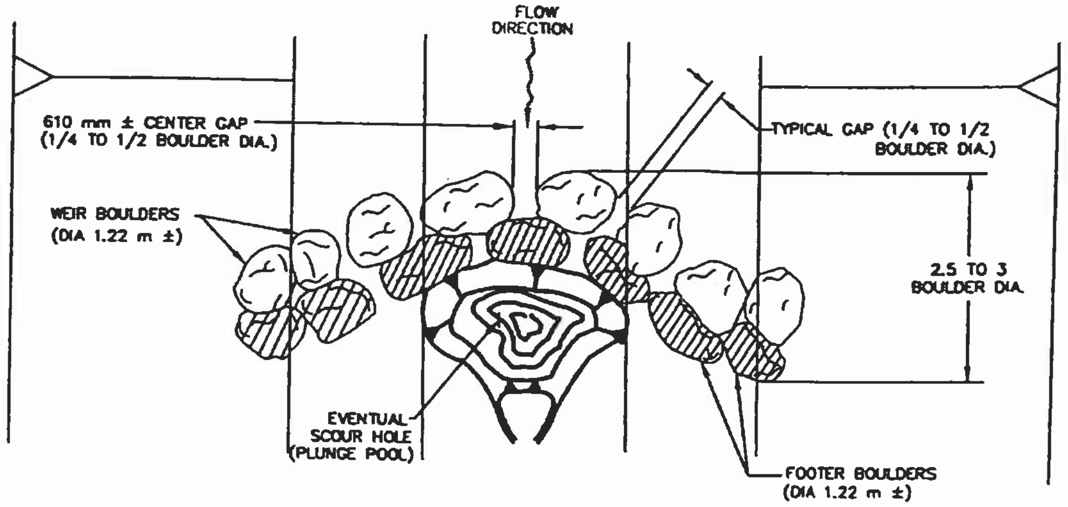
The Proposed Project would include the following flood-control features, as shown in figures 2-2 to 2-8:

- minor bank modification at the I-880 bridge approach in reach A;



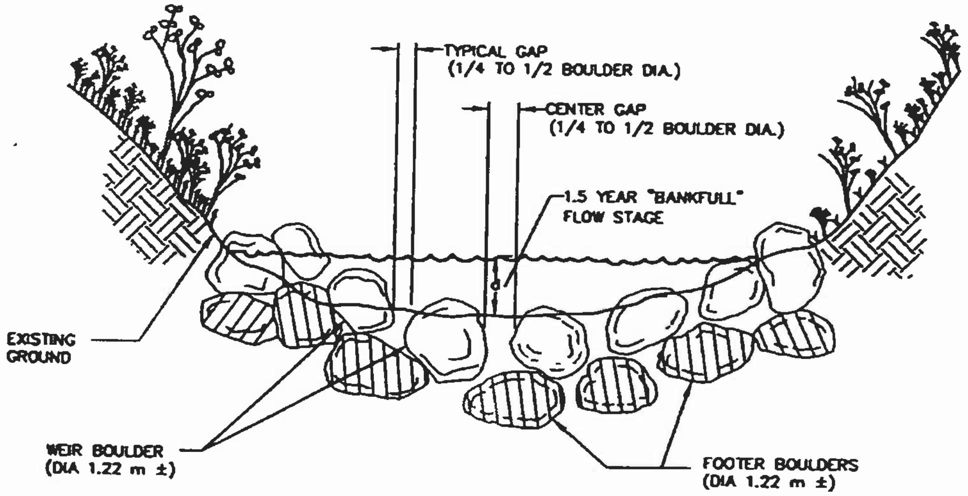
Source:
CH2M Hill 2000a.

Figure 2-2
Alternative 2: Floodwalls/Levee Raise
General Plan



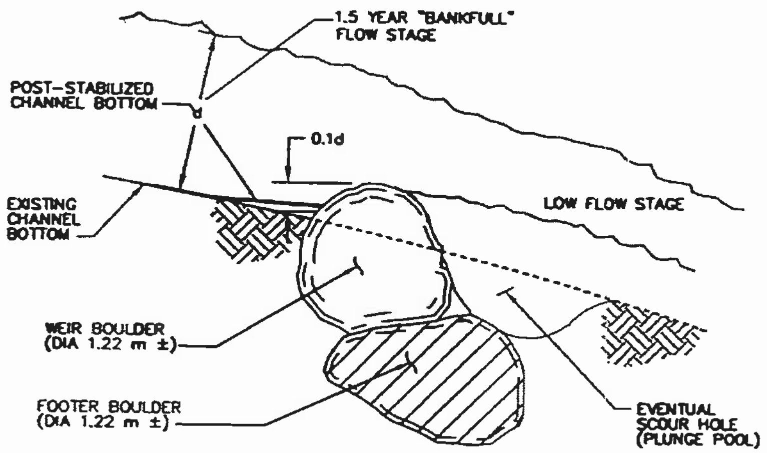
FLOW DIRECTION
610 mm ± CENTER GAP (1/4 TO 1/2 BOULDER DIA.)
TYPICAL GAP (1/4 TO 1/2 BOULDER DIA.)
WEIR BOULDERS (DIA 1.22 m ±)
2.5 TO 3 BOULDER DIA.
EVENTUAL SCOUR HOLE (PLUNGE POOL)
FOOTER BOULDERS (DIA 1.22 m ±)

PLAN VIEW
NTS



TYPICAL GAP (1/4 TO 1/2 BOULDER DIA.)
CENTER GAP (1/4 TO 1/2 BOULDER DIA.)
1.5 YEAR "BANKFULL" FLOW STAGE
d
EXISTING GROUND
WEIR BOULDER (DIA 1.22 m ±)
FOOTER BOULDERS (DIA 1.22 m ±)

TYPICAL SECTION
LOOKING UPSTREAM
NTS



1.5 YEAR "BANKFULL" FLOW STAGE
POST-STABILIZED CHANNEL BOTTOM
d
0.1d
EXISTING CHANNEL BOTTOM
LOW FLOW STAGE
WEIR BOULDER (DIA 1.22 m ±)
FOOTER BOULDER (DIA 1.22 m ±)
EVENTUAL SCOUR HOLE (PLUNGE POOL)

PROFILE VIEW
NTS

Source:
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Figure 2-3
Vortex RockWeir

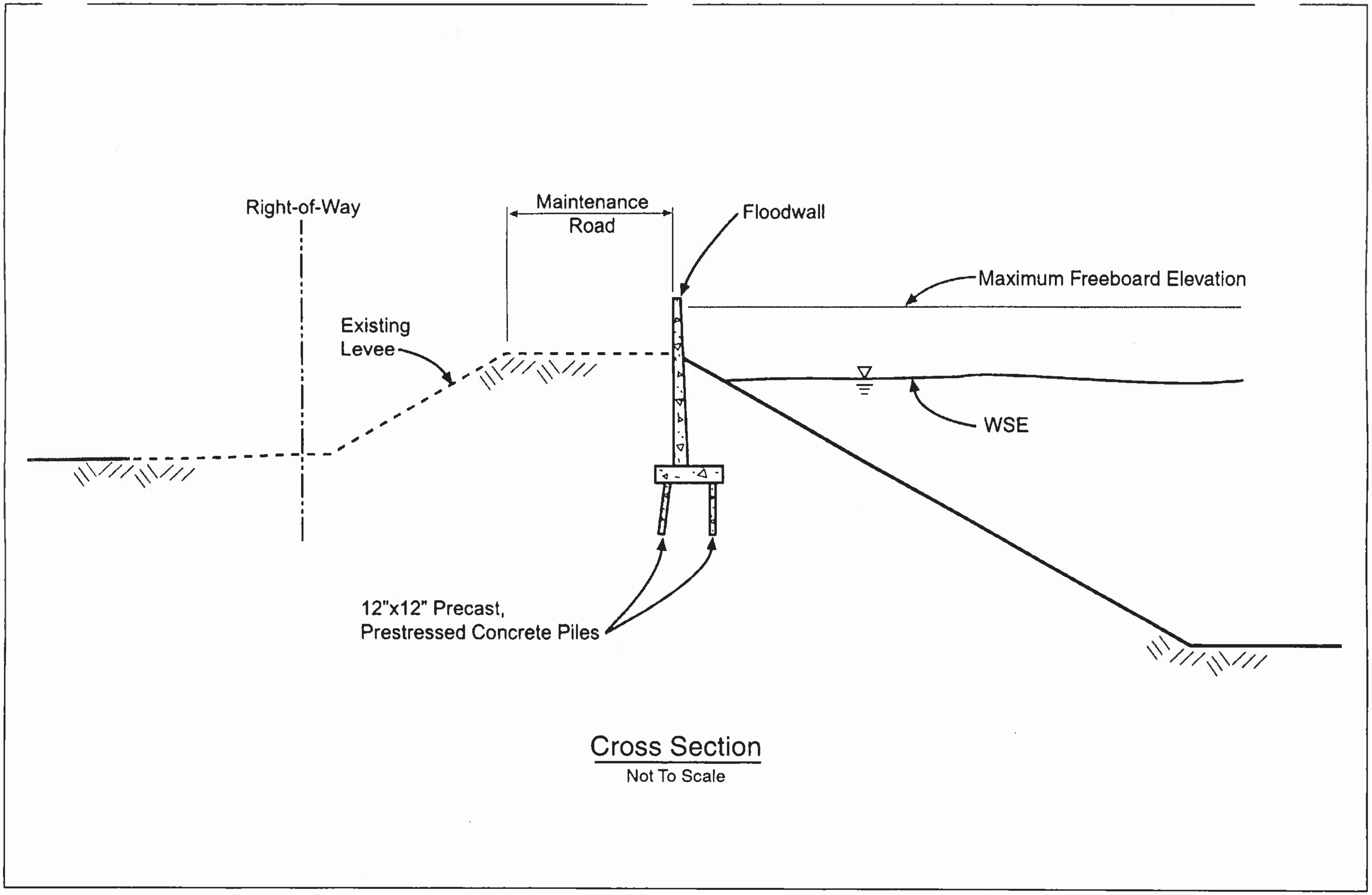

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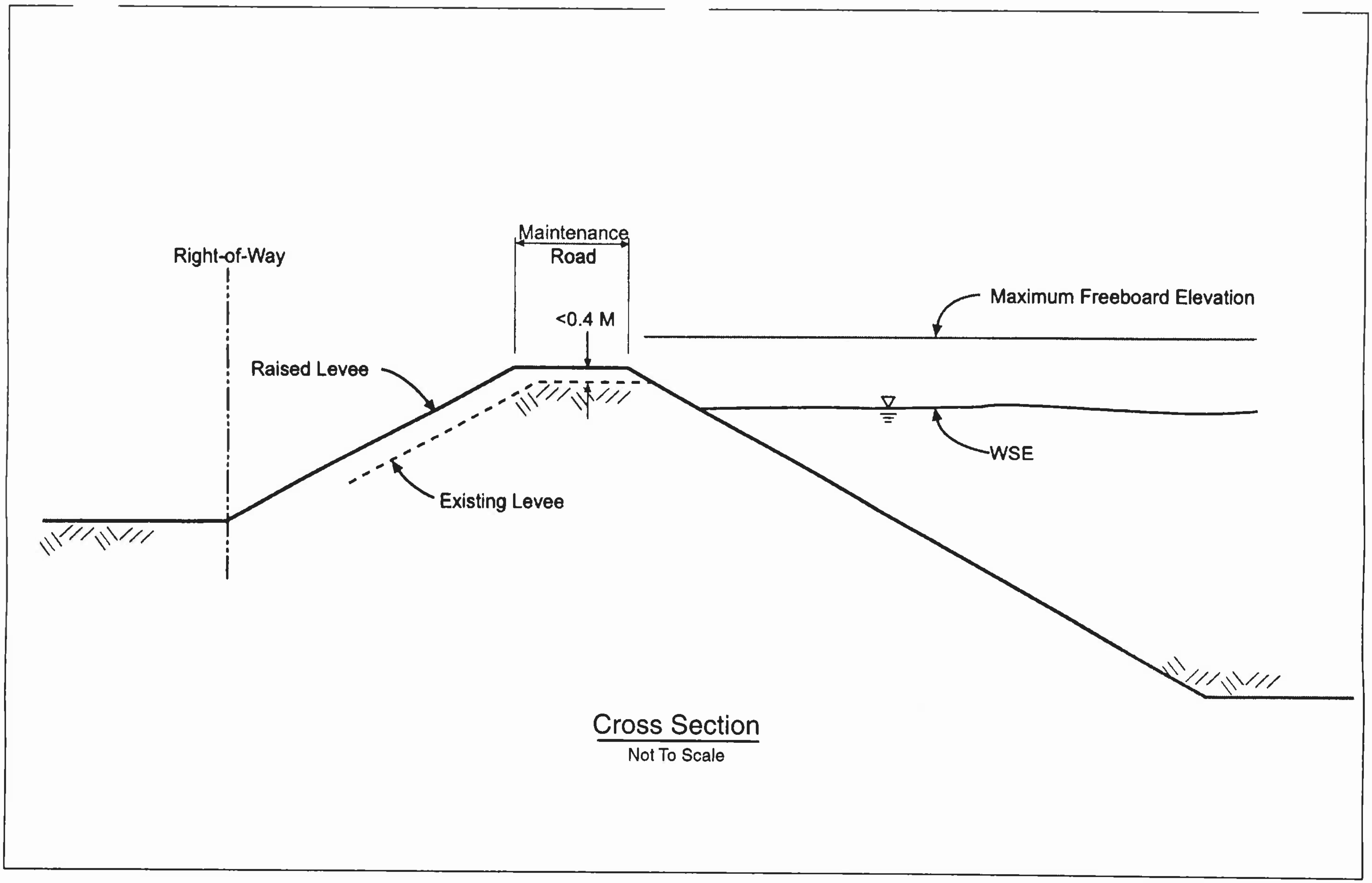
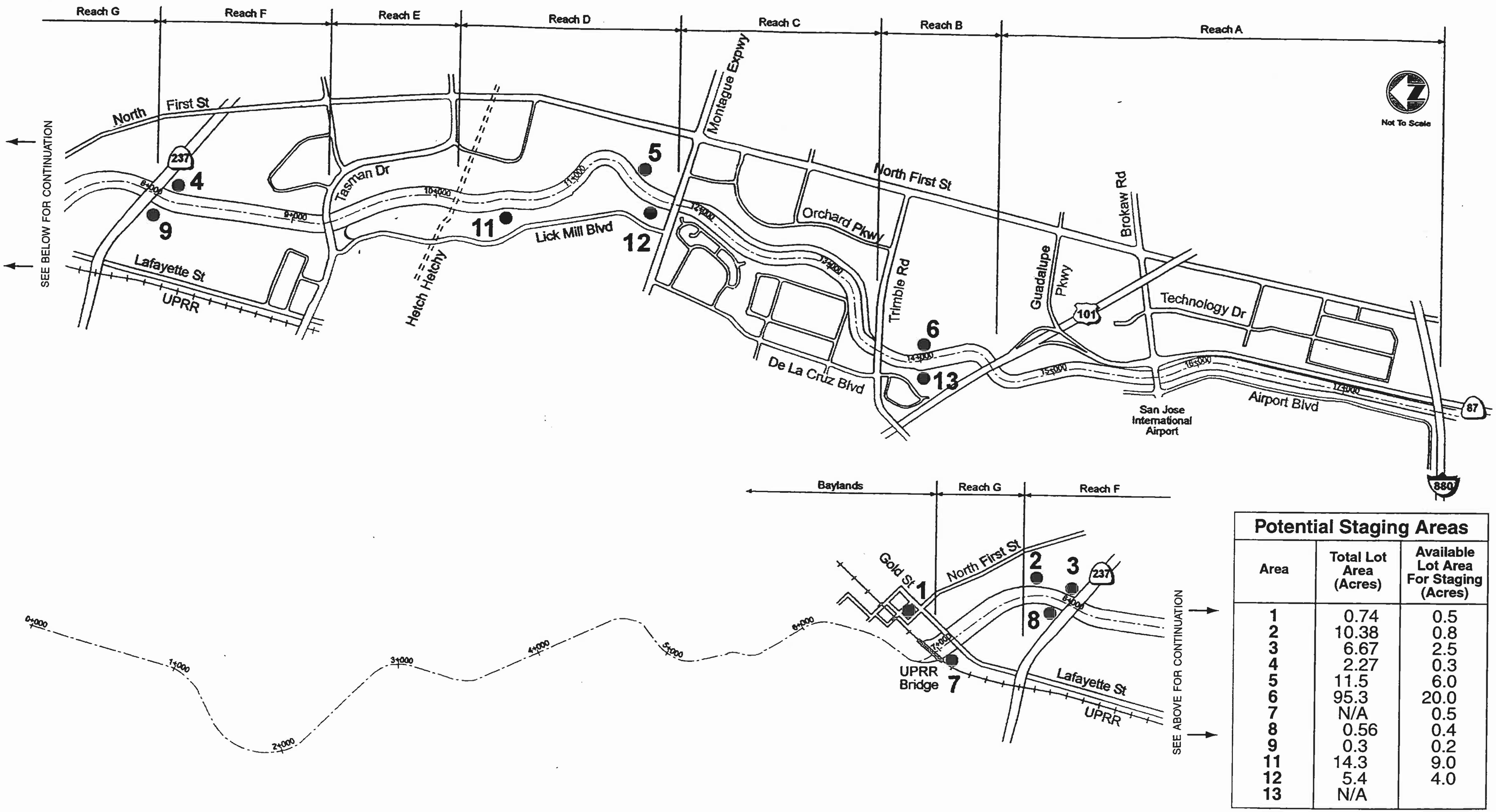
Figure 2-4. Floodwalls at Bridges



Source:
CH2M Hill 2000a.

Figure 2-5. Raised Levee on Outboard Side Slope



Potential Staging Areas

Area	Total Lot Area (Acres)	Available Lot Area For Staging (Acres)
1	0.74	0.5
2	10.38	0.8
3	6.67	2.5
4	2.27	0.3
5	11.5	6.0
6	95.3	20.0
7	N/A	0.5
8	0.56	0.4
9	0.3	0.2
11	14.3	9.0
12	5.4	4.0
13	N/A	

Source:
CH2M Hill 2000a.

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Figure 2-6
Potential Construction Staging Areas

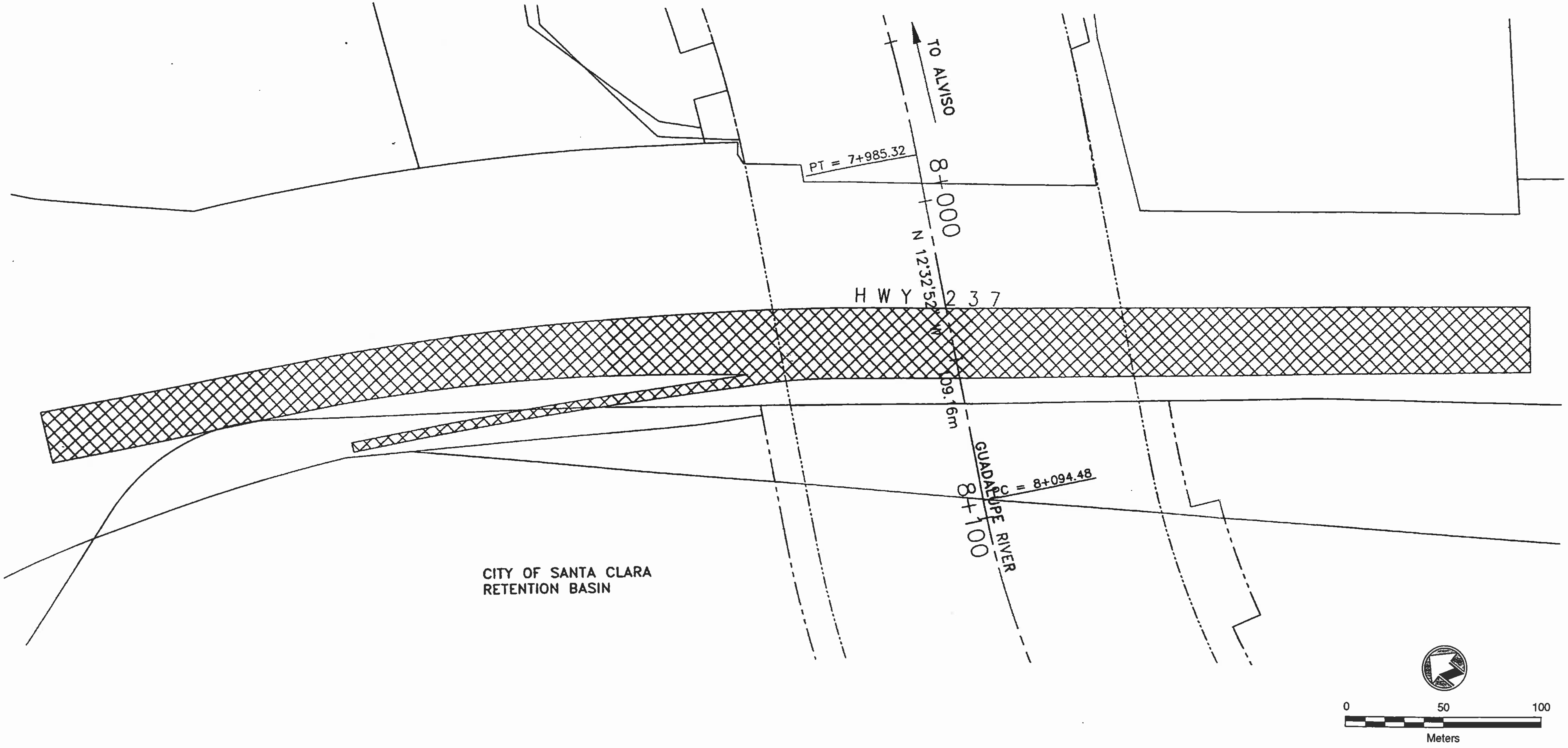

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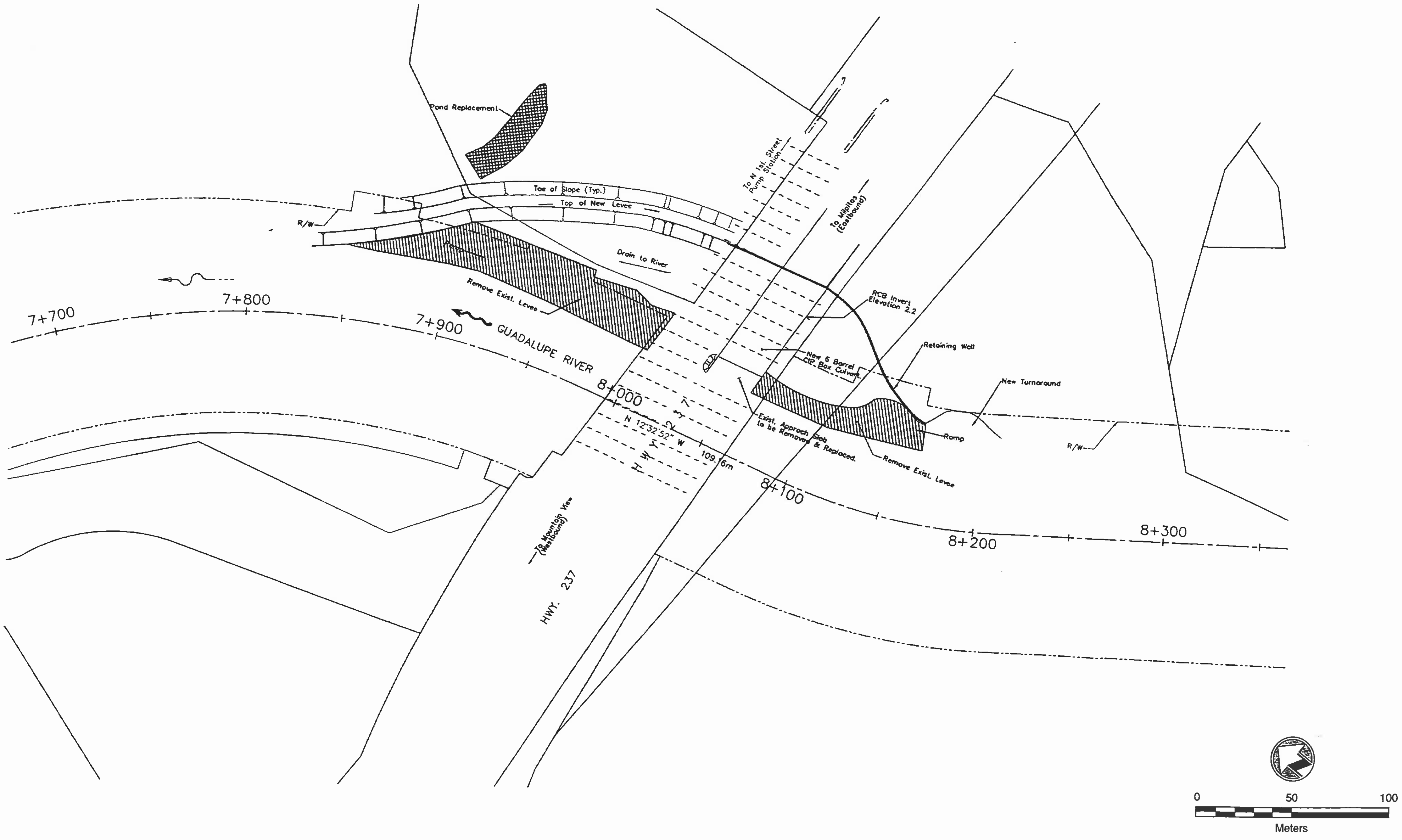
Figure 2-7
Boundaries of Construction to Raise Eastbound SR 237 Bridge



Source:
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Figure 2-8
Bypass to SR 237 Bridge

- construction of up to ~~4 vortex rock~~ 6 grade control weirs in the reach A low-flow channel downstream of I-880 and grade control weirs at U.S. 101, Trimble Road, and Montague Expressway;
- construction of floodwalls in reach A (west bank) upstream of U.S. 101, in reach F upstream of SR 237, and in reach G;
- construction of levee raises in reaches ~~B~~A–F;
- replacement of the SR 237 eastbound bridge ~~to match the westbound bridge profile~~;
- modification of up to 19 stormdrain outfalls;
- improvement of maintenance access roads and construction of maintenance road undercrossings at bridges;
- moderate to aggressive management of sediment and vegetation in reaches A–G;
- accommodation of future recreation trail extensions on LGRP levees; and
- levee maintenance.

Structural Features

Reach A Modifications

Reach A modifications for the Proposed Project would include minor bank contouring on the east and west banks for approximately 9.1 m (30 feet) downstream of the I-880 bridge approach to ensure a smooth transition from bridge abutments to the reach A banks. Banks would be contoured with a backhoe by scraping bank material to match the approach to the bridge.

Construction of up to ~~4~~ 6 ~~vortex rock~~ grade control weirs in the reach A low-flow channel would also be required to stabilize the channel bottom, improve stream habitat, and reduce the potential for bank erosion. The weirs would act as grade control structures that would minimize upstream lateral migration of the low-flow channel, bank erosion, and aggradation. The ~~vortex rock~~ grade control weirs would be constructed with large boulders varying from 0.9 m to 1.5 m (3–5 feet) in diameter and would be keyed into the bank to eliminate erosion. The weirs would be constructed in an arch with the point of the arch facing upstream and the span at the minimum of the bankfull channel width. This design would form a vortex that would direct stream energy away from the banks and create a downstream plunge pool for energy dissipation. Footer rocks would be installed for anchoring and to prevent undermining of the weir structures.

The weirs would also provide additional instream cover and deepen pools for fish while providing for adequate fish migration. The upstream-to-downstream elevation difference for the weir structure would be limited to approximately 0.6 m (2 feet) (figures 2-2 and 2-3).

Floodwalls

The Proposed Project would require the construction of concrete floodwalls in reach A upstream of U.S. 101, upstream of SR 237 in reach F, and on both levees in all of reach G between SR 237 and the UPRR crossing (figure 2-2). Floodwall heights at these locations would vary but would not exceed 1.22 m (4 feet) and would be constructed at the inboard hinge of the top of the levee (figure 2-4). The floodwalls would be constructed similar to a standard Type 1 retaining wall and would require excavating the top of the levee at the inboard hinge to place drilled piles or spread footings, as shown in figure 2-4. Construction would require backhoes, loaders, pile drivers, and a concrete delivery system operated from the top of the levee access road. All construction activities at these locations would be between the District's ROW and the inboard toe of the levee.

Levee Raising

The Proposed Project would also require raising levees to improve channel flow conveyance and meet channel freeboard criteria on existing levees in reaches B–F (figure 2-2). The height of raised levees in these areas would vary but would not exceed 0.6 m (approximately 1.97 feet). Where levee raising is the preferred treatment, levees would be raised by extending the outboard side slope to the desired height (figure 2-5). Two possible concepts would be applied for this alternative:

- raising levees without construction of an outboard levee toe retaining wall in areas where adequate District ROW exists, or
- raising levees with construction of an outboard levee toe retaining wall.

Decisions about which concepts to apply throughout the construction area would be based on the availability of ROW and cost. The slope of levees would be maintained at approximately 2:1 (vertical to horizontal distance) and levee tops would be approximately 5.5 m (18 feet) wide with maintenance access ramps constructed on both sides of the river near bridge crossings. Construction of levees would involve the use of heavy equipment, including excavators, dump trucks, front loaders, concrete trucks, and equipment to drive the piles for the retaining walls. Construction of levees would be conducted from the District's ROW to the inboard toe of the existing levees.

Figure 2-6 shows the potential construction staging area locations that could be needed to store heavy equipment during construction of the Proposed Project. Staging areas would be located where they would not affect sensitive wildlife or wetland areas or known historic or archaeological resources. Access to the construction sites would be from existing bridge crossings and levee maintenance roads. A total of approximately 95 trucks per day would be required during the construction period of approximately 1 year for transport of fill material, pouring and forming concrete, pile driving, and excavation.

Replacement of State Route 237 Bridge

The eastbound SR 237 bridge in reaches F and G poses a substantial constriction of the lower Guadalupe River channel capacity. To improve channel capacity at this location, the bridge would be demolished and a new bridge would be built approximately 2 feet higher than ~~to match the height of~~ the existing westbound bridge and road profile. The westbound bridge is being built 2 feet higher to meet the District's and FEMA's requirement of 4 feet of freeboard within 100 feet of bridges. The new bridge would be constructed within and immediately adjacent to the existing bridge footprint (figure 2-7). Bridge construction would begin in late spring or early summer during seasonal low flows in the lower Guadalupe River. A construction staging sequence has been developed to maintain operation of all 4 eastbound lanes of SR 237 during peak traffic periods. During construction, the width of the eastbound lanes would be reduced to 3.35 m (11 feet) and lane shoulder width would be reduced to 0.61 m (2 feet). This element of the Proposed Project would require coordination with Caltrans to approve the bridge design and construction. Temporary construction noise on the southeast side of the bridge would be reduced by constructing a temporary sound barrier adjacent to the mobile home park. (See chapter 5 of the Engineer's Report for a detailed description of the proposed bridge design, construction methods, construction staging, and costs.)

State Route 237 Bypass Option

An option to raising the SR 237 bridge would be to construct a bypass structure under the eastbound SR 237 bridge. This option is proposed as a backup design element that could be implemented to increase channel capacity at SR 237 should bridge raising be determined to be infeasible for some unforeseen reason. A bypass culvert constructed under SR 237 is a potentially viable option to bridge raising if construction would result in less traffic disturbance on SR 237. Potential problems associated with bypass culverts are the potential need to purchase ROW conflicts with adjoining land uses, and maintenance of culverts.

The bypass culvert option would be constructed on the east side of the river to increase the lower Guadalupe River channel capacity by up to 198 cms (7,000 cfs) at this location. Floodflows would begin spilling over the intake weir when flows reach approximately 42 cms (1,500 cfs) in the channel.

The bypass would be a 6-barrel cast-in-place concrete box culvert with dimensions of approximately 57 m (187 feet) wide, 2.5 m (8.2 feet) deep, and 25 m (82 feet) long (figure 2-8; see also chapter 4 of the Engineer's Report). The walls of the culvert would be constructed to align with bent supports for an existing viaduct under the westbound SR 237 bridge to maximize hydraulic performance. The top of the culvert would be constructed to serve as the vehicular travel surface on the bridge. Armoring in the channel would be required for approximately 100 m (330 feet) upstream of the inlet structure and 150 m (490 feet) downstream of the outlet structure. A retaining wall is proposed along the east side of the bypass southeast of SR 237 to minimize property acquisition and avoid relocating housing units in this area. To reduce the nuisance factor of bypass construction, a temporary soundwall would be constructed along property lines.

Construction of a SR 237 bypass channel would require a 1.5-hectare (3.6-acre) construction zone in reaches F and G. Construction of these facilities would require excavators, loaders, dump trucks, concrete delivery equipment, and cranes that would access the construction zone from SR 237 and adjacent streets. Construction of the bypass would also require removal of a portion of the soundwalls adjacent to SR 237.

Drainage Outfall Modification

Implementation of the Proposed Project could also require modification of up to 19 drainage outfalls in reaches C–G. Modifications would generally be limited to placement of a hardened surface (i.e., rock riprap) adjacent to existing drainage outfalls to reduce bank erosion from outfall discharges.

Maintenance Roads and Recreational Trails

Maintenance roads would be repaired, upgraded, and widened from I-880 to the UPRR crossing to meet district standards. Maintenance roads on top of levees and in the channel would be approximately 5.5 m (18 feet) wide. New maintenance roads would be constructed under all bridges and would require some channel hardening in the vicinity of ramps from the channel to levee tops. In some areas where levee roads would need to be widened, retaining walls on the back side of levees may be needed to ensure that the levee is constructed in the District's ROW.

New depressed maintenance roads would be constructed in reach G on the east and west banks to provide access for maintenance vehicles and heavy equipment. The new maintenance roads would be 6.4 m (21 feet) wide and extend from SR 237 to the Gold Street bridge.

The lower Guadalupe River levee maintenance roads would be upgraded to 5.5 m (18 feet) wide with turnarounds. Use of maintenance roads for formal designation as recreation trails is not an element of the LGRP but could potentially be accommodated as a separate project at a future date.

Levee Maintenance

Levee and access-road maintenance under the Proposed Project would require levee stability improvements and repairs to ensure the stability of existing levees. Implementation of the Proposed Project would also require annual monitoring of the levees for settlement and seepage. Levee maintenance would consist of removing trees, vegetation, and other debris; stripping off all cracks/erosion and sloughing areas, sealing animal burrows, and removing the upper 0.9 m (3 feet) of expansive soils.

Nonstructural Features

Modification of the flood-control channel would also be required under the Proposed Project to ensure the integrity of new flood-control structures and ensure that the channel capacity in the lower Guadalupe River is improved and maintained for the 100-year life of the LGRP. Implementing the Proposed Project would require initial removal of sediment and vegetation during construction of the project to ensure the hydraulic capacity of the channel. Once the desired channel configuration is established, routine sediment and vegetation maintenance would be required to maintain the "as built" condition for the life of the project. Routine maintenance of the channel in future years would not result in additional impacts that would need to be mitigated under the Proposed Project. Please refer to the discussion below and chapter 6 of the Engineer's Report for a detailed description of these nonstructural project features and maintenance guidelines.

Sediment Management

Implementation of the structural flood-control features of the Proposed Project would require sediment excavation in reaches B–E to ensure that the designed channel capacity is maintained for the 100-year life of the project (see chapter 6 of the Engineer's Report for a reach-by-reach detail of the proposed sediment management program). The *Lower Guadalupe River*

Sedimentation Study (Northwest Hydraulic Consultants 2000) indicates that most of the sediment deposition in the lower river is in reaches B–E (approximately 13,610–15,420 metric tons [15,000–17,000 tons] per year).

The sediment management feature of the Proposed Project requires sediment to be reexcavated in portions of the channel and to be maintained in a manner similar to that recommended in the 1982 *Lower Guadalupe River Planning Study* (Santa Clara Valley Water District 1982). In these reaches, buffer areas would be required for the low-flow channel and riparian corridor, where sediment management is restricted. Sediment management activities would occur in the channel during summer and fall when flow inundation in these areas is a low probability. Please refer to chapter 6 of the Engineer's Report.

Periodic removal of sediment in reaches B–E would be assessed annually by District staff as presented in chapter 6 of the Engineer's Report. Sediment removal during project construction would involve initial excavation in all sediment management areas. Sediment could be subsequently removed in alternating strips in various areas, depending on the rate and location of sedimentation.

Vegetation Management

In addition to removal of channel vegetation as part of sediment management activities, long-term LGRP channel capacity would require initial removal of vegetation in areas of the channel to establish initial operating conditions of the project. Once the initial vegetation conditions are established, periodic removal of vegetation to control the size and growth of riparian forest, riparian scrub, seasonal and perennial wetland vegetation, and ruderal herbaceous vegetation would be required. (See chapter 6 of the Engineer's Report.) Vegetation management would be required in areas of reach A that are not proposed for riparian planting by the Corps or Caltrans or for a 4.5-m (15-foot) buffer area adjacent to the low-flow channel. Vegetation would generally be removed in alternating strips on either side of the channel to ensure that as much wildlife habitat as possible is maintained for each reach.

The goal of the vegetation management program is to balance the need to periodically remove vegetation from the flood-control channel with the need to maintain and enhance ecological functions and values in the lower Guadalupe River. The vegetation management program for reaches A–F would include initial removal of vegetation from bridge transition areas, overbank areas, and levees, and would maintain buffer areas along the low-flow channel and riparian corridor. Routine vegetation maintenance would occur in subsequent years to maintain the "as built" channel condition. Woody and herbaceous vegetation would be cut or treated with herbicides in vegetation management areas to reduce vegetation heights to less than 0.3 m (1 foot), as identified in the maintenance standards presented in chapter 6 of the Engineer's Report. Only herbicides approved for use near water, such as Rodeo®, would be used in the vegetation maintenance areas nearest to the low-flow channel, side channels, or wetlands. Herbicides would be used in accordance with all regulations for their use. Herbicides may be used in spot applications to treat individual plants or to treat large clusters of vegetation. Herbicides should be applied by a licensed applicator and under the guidance of a vegetation management specialist. Vegetation management would occur during the summer and fall months when the likelihood of inundation is relatively low.

Reach G would require aggressive vegetation management to remove and prevent regrowth of emergent wetland vegetation to ensure adequate flood conveyance at the SR 237 bridge. Vegetation management in reach G would involve excavating 17.5-m (57.4-foot)-wide areas, on both banks, adjacent to the new depressed maintenance road to a depth of approximately 1 m (3.3 feet). This shallow excavation is intended to reduce the frequency of treatment in this reach of the channel and substantially reduce the roughness created by dense stands of bulrush. Between the excavated area and a 6-m (20-foot) low-flow channel buffer area, vegetation would be managed using herbicide treatment. See also chapter 6 of the Engineer's Report for specific maintenance standards for the LGRP.

Facility and Maintenance Costs

The cost to implement capital improvements and initial sediment and vegetation removal under the Proposed Project is approximately $60.6 million.

Alternative 3: Channel Bank Modification

Alternative 3 would include the following flood-control features, as shown in figures 2-9 and 2-10:

- minor bank modification at the I-880 bridge approach in reach A;
- construction of up to 4 vortex rock weirs in the reach A low-flow channel downstream of I-880;
- construction of floodwalls at the upstream and downstream approaches of U.S. 101, Trimble Road, and Montague Expressway;
- excavation of the inboard toe of the existing levees and construction of a vertical or near-vertical channel wall with an apron at the resulting

channel bench between Montague Expressway and the UPRR bridge (reaches D–G);

- construction of a channel wall extension up to 1 m (3.3 feet) high above the top of the levee between Montague Expressway and the UPRR bridge (reaches D–G);
- possible realignment of the Hetch Hetchy Aqueduct;
- improvement of the maintenance access roads; and
- moderate to aggressive sediment and vegetation management in reaches A–G.

Structural Features

Reach A Modifications

Reach A modifications under the Channel Bank Modification Alternative would be the same as those identified for the Proposed Project.

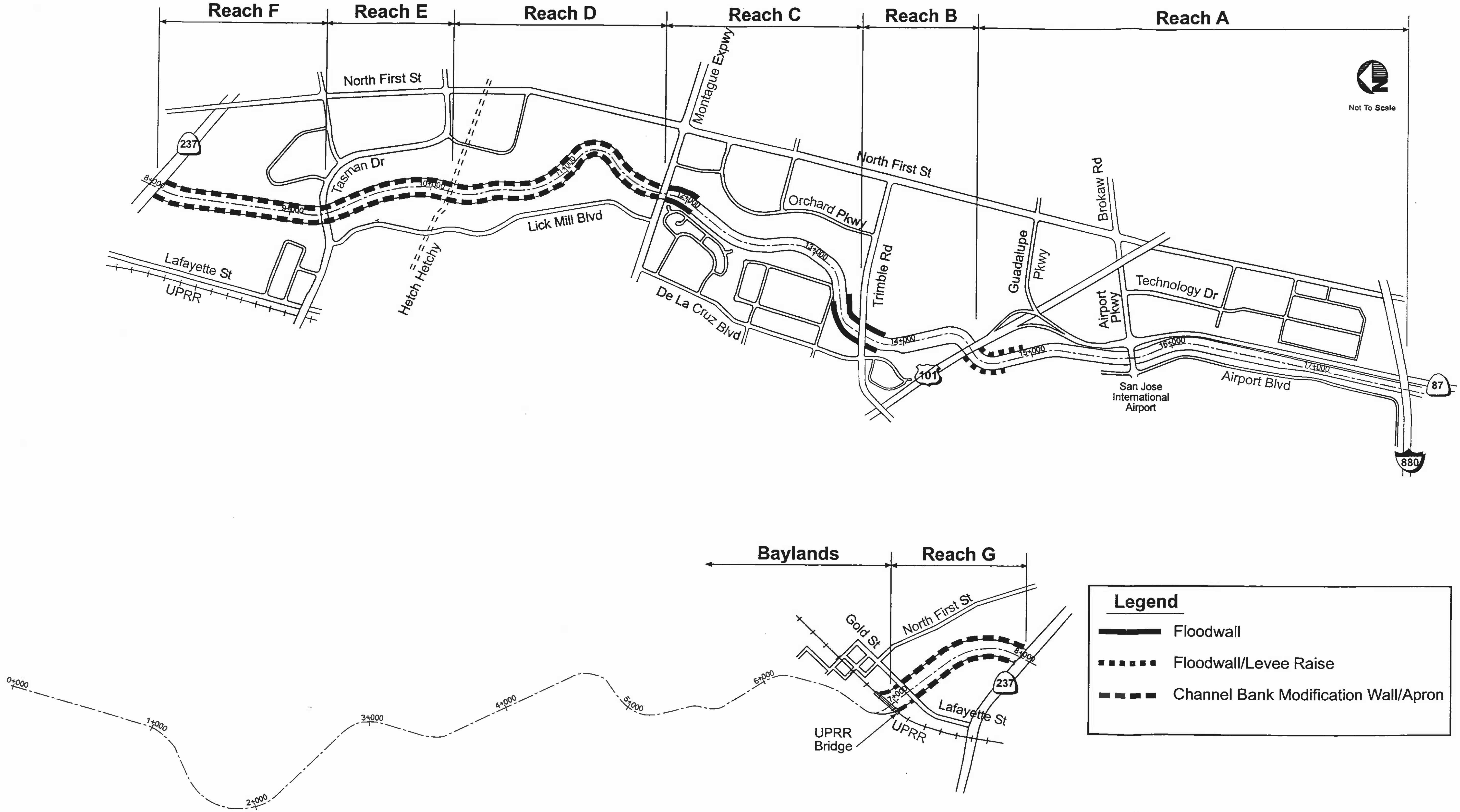
Bridge Approach Floodwalls

Bridge approach floodwalls under the Channel Bank Modification Alternative would consist of 0.6-m (2-foot)-high floodwalls 30 m (98.4 feet) upstream and downstream of the U.S. 101, Trimble Road, and Montague Expressway bridge approaches. Floodwalls would be constructed on the inboard hinge of the levee top in a manner similar to that described for the Proposed Project.

Channel Bank Modification

Implementation of the Channel Bank Modification Alternative would involve excavation of the inboard toe of the existing levees and construction of a vertical or near-vertical wall with an apron at the new channel bench (figure 2-10).

The channel wall improvements would be required between Montague Expressway and the UPRR bridge in reaches D–G (figure 2-9); they would be constructed mainly of MSE or a similar, hardened surface that could be planted with compatible vegetation. The new channel apron would be covered with concrete-block mattresses, a cellular confinement system, or soil cement to provide a high-strength design for dual use as maintenance access roads. Limited portions of the channel wall and apron could be constructed of concrete in areas that require protection of existing structures, such as pump-station outfalls, and in areas such as bridge approaches, which



Source:
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Figure 2-9
Alternative 3: Channel Bank Modification General Plan

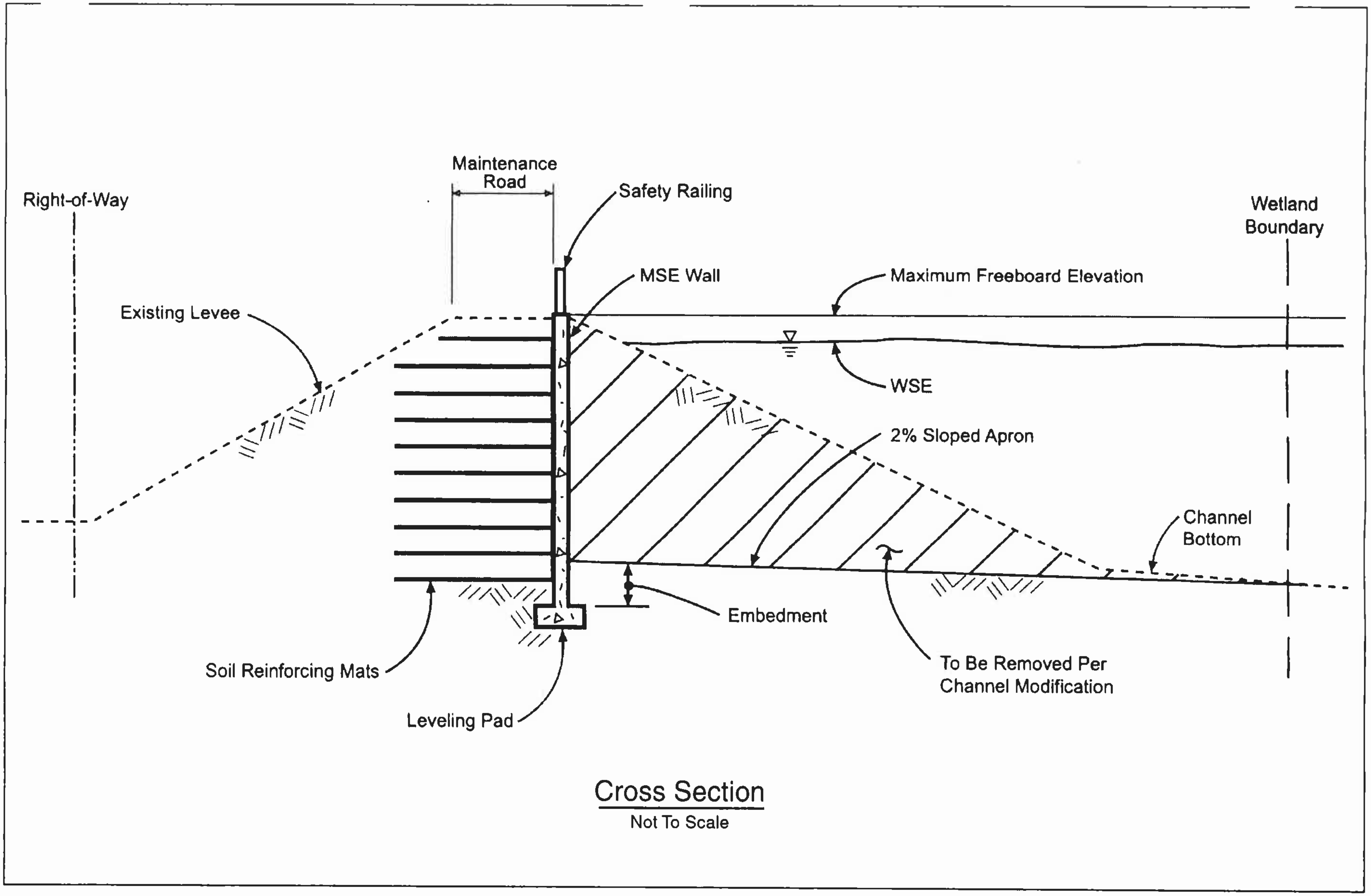

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Figure 2-10. Alternative 3: Channel Bank Modification

require the lowest channel roughness possible. Construction of a channel wall would extend beyond the top of the existing levees by up to 1 m (3.3 feet); the apron width would extend slightly beyond the existing inboard toe of the levees, but would generally avoid wetlands.

The construction of the channel modification structures in reaches D–G would require use of equipment similar to that identified above for the Proposed Project. (Staging areas adjacent to reaches D–G are shown in figure 2-6.) The total area of the potential construction zone would be approximately 55 hectares (137 acres), including the sites on both the east and west banks. Generally, the construction-zone boundary for this alternative would be the existing ROW on both sides of the channel as far as the proposed edge of the new channel apron.

Construction of the channel wall and apron in the vicinity of the Hetch Hetchy Aqueduct crossing could require realignment of the Hetch Hetchy pipelines, which are 2.3 m (92 inches) and 1.8 m (72 inches) in diameter. The pipelines would be realigned to a depth of approximately 2 m (6.5 feet) below the current invert elevation of the low-flow channel. They would be realigned by bypassing each pipe individually, providing uninterrupted use, and replacing the existing pipeline with a new pipeline at the channel crossing, then reconnecting the new realigned pipeline segment. Additional minor levee raising could be needed upstream in reach D to accommodate channel restriction if it is determined that realigning the pipelines is not feasible.

Drainage Outfall Modification

Drainage outfall modifications under the Channel Bank Modification Alternative would be the same as those identified for the Proposed Project for reach C. These modifications would involve incorporating the drainage outfall into the channel bank modification structure in reaches D–G.

Maintenance Roads and Recreational Trails

The Channel Bank Modification Alternative would require improvements to the maintenance roads and recreation trails similar to those identified for the Proposed Project. Future recreation trail extension would be accommodated under this alternative.

Nonstructural Features

Sediment and vegetation management under the Channel Bank Modification Alternative would be the same as that described under the Proposed Project.

Facility and Maintenance Costs

The cost to implement the Channel Bank Modification Alternative is approximately $72 million.

Alternative 4: Channel Bypass

The Channel Bypass Alternative would involve increasing the capacity of LGRP reaches A–G by constructing 2 bypass culverts to convey the design floodflow of 481 cms (17,000 cfs). Alternative 4 would include the following flood-control features as shown in figures 2-11 and 2-12:

- increasing the height of levees and performing some channel excavation in reach A;
- constructing 2 new bypass box culverts entirely within the confines of the existing east and west lower Guadalupe River levees;
- improving maintenance access roads and accommodating future recreation trails on levees; and
- moderately managing sediment and vegetation in reaches A–G.

Structural Features

Reach A Modifications

Reach A modifications for Alternative 4 would be the same as identified for the Proposed Project (figure 2-12).

Bypass Culverts

This alternative would involve the construction of 2 bypass box culverts that would convey the design flows that exceed the existing capacity of the lower Guadalupe River to a downstream discharge location in the baylands study area. The reinforced concrete box culverts would be constructed in both the west and east levees (figure 2-13). The west culvert would be 8.5 m (27.9 feet) wide and between 3.5 and 5 m (11.5 and 16.4 feet) high. The culvert intake would begin upstream of U.S. 101 and extend approximately 7,485 m (24,558 feet) downstream to the vicinity of the community of Alviso. The east culvert would be approximately 8.5 m (27.9 feet) wide and 5 m (16.4 feet) high. Its intake would begin downstream of Montague Expressway and extend approximately 4,700 m (15,420 feet) downstream to below Gold Street in reach G. The invert of the bypass culverts would extend below the

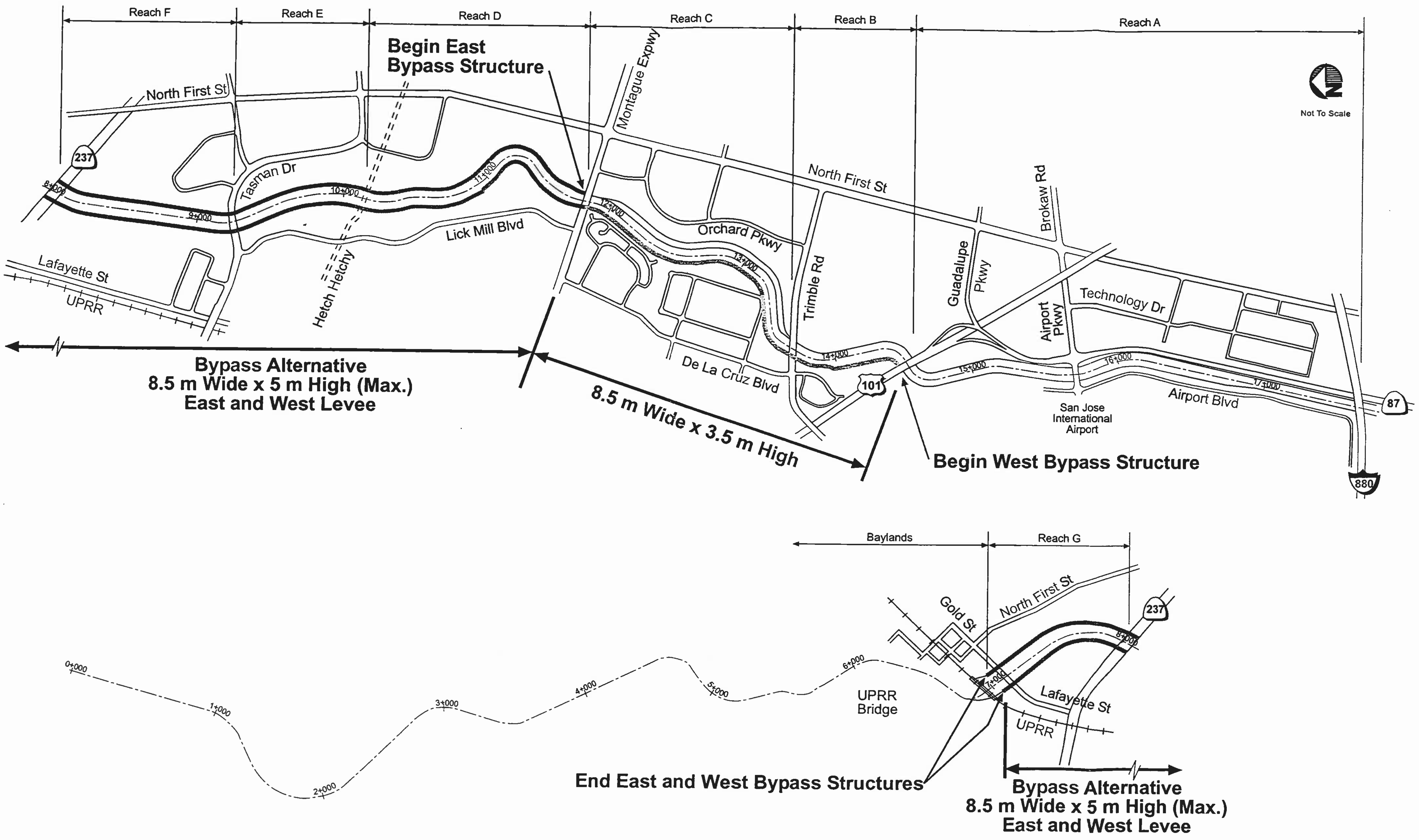

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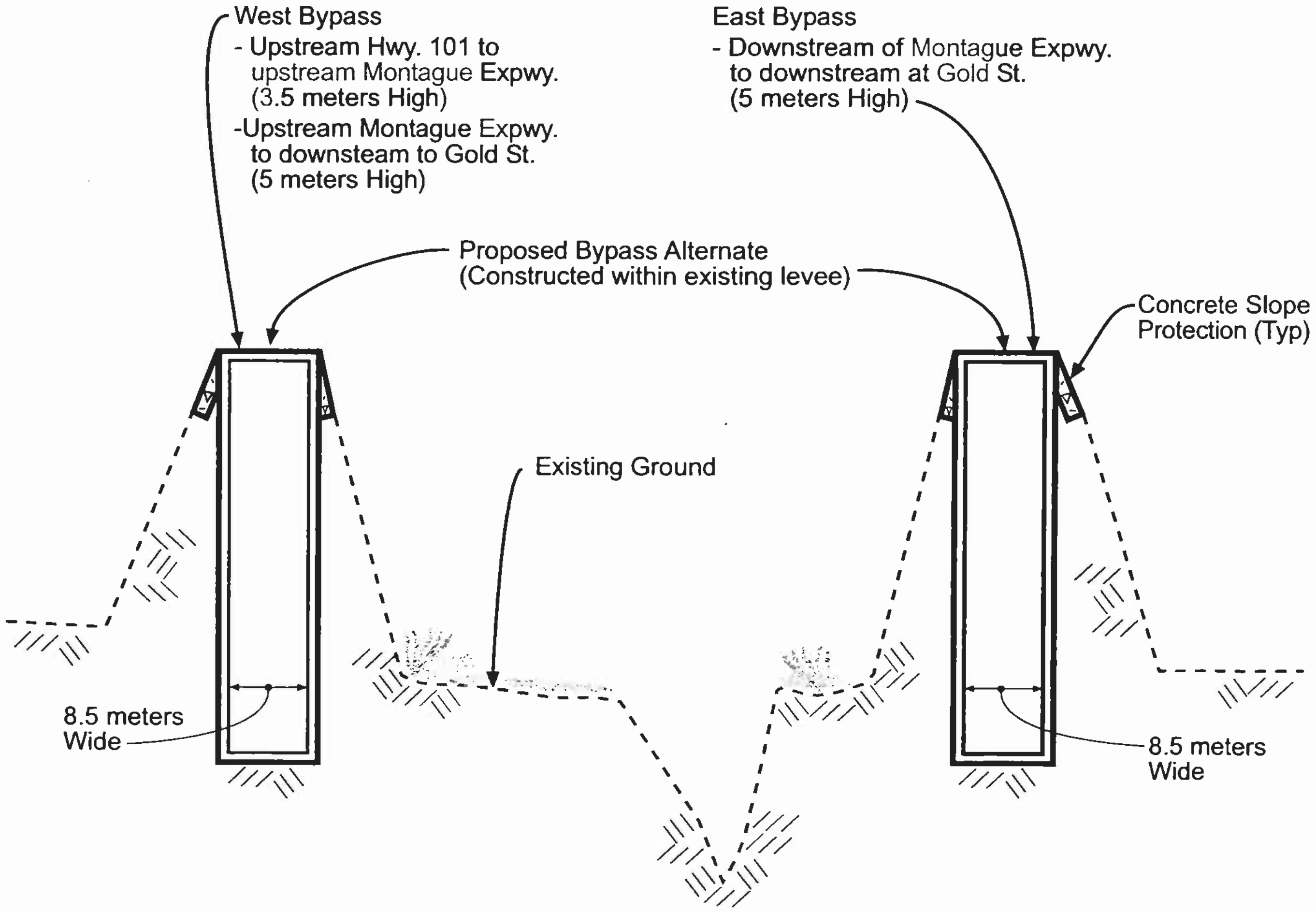
Figure 2-11
Alternative 4: Channel Bypass General Plan


West Bypass
- Upstream Hwy. 101 to upstream Montague Expwy. (3.5 meters High)
-Upstream Montague Expwy. to downsteam to Gold St. (5 meters High)
East Bypass
- Downstream of Montague Expwy. to downstream at Gold St. (5 meters High)
Proposed Bypass Alternate (Constructed within existing levee)
Concrete Slope Protection (Typ)
Existing Ground
8.5 meters Wide
8.5 meters Wide

Section

(Looking Downstream)

Not To Scale

Source:
CH2M Hill 2000a.

09230.99 540 (7/01)

Figure 2-12. Alternative 4: Channel Bypass Typical Cross Section

existing levee toe invert. The top of the culverts would not extend above the existing levee height and would be designed as a levee maintenance road.

The inlet of the west and east bypass culverts would consist of a control weir that would allow floodflows to begin entering the bypass when flows reach approximately 42.5 cms (1,500 cfs). Floodflows would continue to flow in the main channel. Riverbed and bank armoring at the inlet and outlet structures would be required, consisting of riprap, concrete cellular mattresses, or similar channel hardening structures.

Construction of bypass structures at lower Guadalupe River bridge crossings may require realignment of the bypass culverts outside the current channel ROW in a manner that may encroach on adjacent buildings and other land uses, potentially requiring acquisition of additional ROW.

Construction of both the west and east bypass culverts would require realignment of the 183-cm- (72-inch-) and 229-cm- (90-inch-) diameter Hetch Hetchy Aqueducts. The pipelines would need to be extended below the bypass culvert inverts.

Maintenance Roads and Recreational Trails

Maintenance road and recreation trail improvements would be similar to those identified for the Proposed Project.

Nonstructural Features

Sediment Management

Sediment management under Alternative 4 would be similar to that described for the Proposed Project. Sediment would be initially excavated to optimize channel flood conveyance capacity and periodic routine sediment maintenance would occur as needed to maintain the "as built" condition of the channel over the life of the project.

Vegetation Management

Vegetation management under Alternative 4 would be similar to that described for the Proposed Project.

Facility and Maintenance Costs

The order-of-magnitude cost to implement this alternative, including initial channel sediment excavation and vegetation removal, is estimated to be $200 million. Please refer to chapter 4 of the Engineer's Report.

Environmentally Superior Alternative

Section 15126.6(e) of the State CEQA Guidelines requires the District to identify the environmentally superior alternative. If the no-project alternative is also the environmentally superior alternative, the EIR will also identify an environmentally superior alternative from among the other alternatives.

On the basis of the analyses of the potential environmental impacts, the Proposed Project, the Floodwalls/Levee Raise Alternative, has been determined to be the environmentally superior alternative. The Floodwalls/ Levee Raise Alternative would cause slightly fewer impacts on biological resources (see "Vegetation and Wildlife" in chapter 3) and cultural resources (see "Cultural Resources" in chapter 3) than all other alternatives because floodwalls would be constructed on existing levees, and because levee raising would take place on the outboard side of the levees, away from sensitive wildlife habitat or wetlands or known cultural resources. In addition, the Floodwalls/Levee Raise Alternative would create fewer construction-related impacts (e.g., noise, reduced air quality, and traffic congestion) than the Channel Bank Modification Alternative or the Channel Bypass Alternative for most of the LGRP reaches. The construction needed for floodwalls and raising levees would generally be simpler than the construction necessary to excavate levees and build MSE or concrete walls in the channel, or to construct bypass culverts in existing levees.

One exception to this assessment is that the SR 237 bridge replacement (or optional bypass culverts), as required under the Proposed Project, would call for a high level of construction activity in a relatively concentrated construction zone along reach F. Construction activities would most likely cause traffic delays, although all 4 eastbound traffic lanes would remain open during construction of the new bridge.

Of the remaining alternatives considered in this EIR, the Channel Bank Modification Alternative would be the next environmentally superior alternative because its impacts on vegetation and wildlife would be similar to those of the Proposed Project and would also require establishing a low-flow buffer area.

The No-Project Alternative would create fewer impacts on biological resources than the Floodwalls/Levee Raise Alternative, Channel Bank Modification Alternative, and Channel Bypass Alternative, however, the No-Project Alternative would not meet the objectives of the LGRP for improved flood protection.

Environmental Commitments

The LGRP has incorporated specific environmental commitments into the project design that would be incorporated into the Proposed Project and the Channel Bank Modification and Channel Bypass Alternatives. The purpose of making these environmental commitments is to avoid, minimize, or compensate for the environmental impacts created by the LGRP. These commitments are generally consistent with the District's standard BMPs and established for the Downtown Guadalupe River Project.

Measures to Avoid and Minimize Adverse Project Effects during LGRP Construction

Under the LGRP action alternatives, preventive measures would be implemented to avoid and minimize potential adverse effects on sensitive resources, including riparian and wetland vegetation and aquatic resources and wildlife, during construction. Measures are also included to reduce construction nuisances and disruptions on nearby residences and businesses and on the transportation system. These preventive measures would include

- a vegetation protection plan,
- a stormwater pollution prevention plan (SWPPP),
- an erosion and sediment control plan,
- a spill prevention and response plan,
- a soil management plan,
- a hazardous and toxic materials contingency plan,
- a construction-area fish management program,
- construction period limits,
- measures to comply with the Migratory Bird Treaty Act,

- Bay Area Air Quality Management District (BAAQMD) feasible control measures for emissions of respirable particulate matter less than or equal to 10 microns in diameter (PM10),
- a traffic management plan,
- a cultural resources management plan,
- coordination with service providers before construction, and
- noise-reducing construction practices.

The requirements associated with these preventive measures would be included in the construction contractor's plans and specifications. The measures are discussed below.

Vegetation Protection Plan

A vegetation protection plan would be prepared and implemented as part of the best management practices (BMPs) included in the LGRP's construction plans and specifications. The vegetation protection plan would include measures to protect vegetation during construction. Before project construction, plastic barricade fencing would be erected, or similar measures would be taken, along construction-area boundaries to protect the vegetation to be avoided. If any protected trees are damaged during construction, they would be trimmed under the direction of a qualified arborist to minimize the risk of disease. Trees not approved for removal but damaged beyond recovery during construction would be replaced with trees of the same species or another species listed on the mitigation plans and specifications in a riparian forest or SRA cover vegetation mitigation area. Replacement ratios would be determined in consultation with USFWS. The selected construction contractor(s) would be responsible for implementing the plan under District oversight.

Stormwater Pollution Prevention Plan

The LGRP is subject to stormwater quality regulations established under the NPDES, described in Section 402 of the CWA. In California, the NPDES program requires that any construction activity disturbing 5 or more acres comply with the statewide general permit, as administered by the SWRCB. The general permit requires elimination or minimization of nonstormwater discharges from construction sites and the development and implementation of a SWPPP for the site. The primary elements of a SWPPP are descriptions of

- site characteristics, including runoff and streamflow characteristics and soil erosion hazard and construction procedures;
- guidelines for proper application of erosion and sediment control BMPs, including vegetative and structural practices, which are to be delineated on a topographic map;
- measures to prevent toxic materials spills; and
- housekeeping practices on the construction site.

The SWPPP also specifies that the extent of soil and vegetation disturbance would be minimized by control fencing or other means and that the extent of soil disturbed at any given time would be minimized. The SWPPP must be retained at the construction site. Implementation of the SWPPP would be monitored during LGRP construction; on completion of construction, the SWRCB would be notified that all state and local requirements were met.

Erosion and Sediment Control Plan

As discussed above, the SWPPP includes measures to minimize erosion and sediment movement into the river. Increased sediment input to a stream has the potential to adversely affect aquatic species and their habitat. An erosion and sediment control plan would be prepared and implemented by the selected contractor(s). The District would oversee implementation of the erosion and sediment control plan. Elements of the plan would require contractors to

- conduct all construction work in accordance with site-specific construction plans that minimize the potential for sediment input to the stream;
- identify with construction fencing all areas that require clearing, grading, revegetation, or recontouring and minimize the extent of areas to be cleared, graded, or recontoured;
- grade spoil sites to minimize surface erosion and apply erosion control measures as appropriate to prevent sediment from entering watercourses or the stream channel, to the extent feasible;
- mulch disturbed areas as appropriate and plant with appropriate species as soon as practicable after disturbance; and
- avoid operating equipment in flowing water by using temporary cofferdams or some other suitable diversion to divert channel flow around the channel and bank construction area.

Spill Prevention and Response Plan

As discussed above, the SWPPP includes measures to prevent spills of toxic materials. Such spills have the potential to adversely affect aquatic species. The selected contractor(s) would prepare and implement a spill prevention and response plan that regulates the use of hazardous materials, such as the petroleum-based products used as fuel and lubricants for equipment and other potentially toxic materials associated with LGRP construction. The District would oversee implementation of the spill prevention and response plan. Elements of the plan would assure that:

- workers would be trained to avoid and manage spills;
- it would be established and implemented before LGRP construction and would include strict on-site handling rules to keep construction and maintenance materials from entering the river;
- all spills would be cleaned up immediately and appropriate agencies notified of any spills and cleanup procedures;
- staging and storage areas for equipment, materials, fuels, lubricants, solvents, and other possible contaminants would be located outside the river's normal high-water area;
- vehicles would be removed from the river's normal high-water area before refueling and lubricating;
- any leaking vehicles would be removed from work areas immediately; and
- equipment would not be operated in flowing water.

Soil Management Plan

The soil management plan includes protocols for classifying the content of wastes in soil. These protocols are based on standard analytical tests used for the disposal of material at appropriately licensed disposal sites (CH2M Hill 1994). The soil management plan also provides criteria for classification of material considered inert, based on California's standard Waste Extraction Test (WET) procedures, as well as procedures for disposal and reuse of these materials. Before disposal, confirmation sampling for all constituents of concern, including metals, hydrocarbons, and polynuclear aromatic hydrocarbons, would be conducted and the soil classified pursuant to the criteria outlined in the approved soil management plan.

Before project implementation, the soil management plan would be updated to reflect the final project design and to incorporate input from the

SFBRWQCB regarding management of soils containing elevated mercury concentrations. The updated soil management plan would be submitted to the SFBRWQCB for approval before implementation.

The following additional restrictions on soil management would be included in the soil management plan submitted to the SFBRWQCB for its approval:

- Sediments with mercury concentrations that exceed hazardous waste criteria under federal or state law must be disposed off-site in appropriately licensed disposal sites. The determination of hazardous properties will comply with all applicable statutes and regulations pertaining to hazardous wastes.
- Excavated soils with mercury concentrations not exceeding hazardous waste criteria but greater than 1 milligram per kilogram (mg/kg) may not be reused on site unless such soils are placed above the low-flow channel or in adjacent areas where frequent exposure to overbank flow is not anticipated, above the water surface elevation defined by the 3-year recurrence interval.
- Excavated surfaces above the 3-year recurrence interval elevation that contain mercury concentrations higher than hazardous waste levels will be overexcavated and replaced with soils meeting the above criteria for on-site reuse. Excavated surfaces below the 3-year recurrence interval elevation that contain mercury concentrations greater than 1 mg/kg will be overexcavated and replaced with clean imported soil.

The limitations on on-site reuse of excavated soils and sediments would also apply to operation and maintenance activities throughout the life of the LGRP.

The 1 mg/kg requirement is based on regulatory guidance from the SFBRWQCB (SFBRWQCB 2000) that states that reducing bank sediment concentrations of mercury to 1 mg/kg or less would reduce the water-column concentration of total recoverable mercury. Water quality in the project area presently exceeds water quality control plan (Basin Plan) numeric water quality objectives for mercury. Therefore, incorporation of the proposed soil reuse restrictions would result in improved water quality under postproject conditions.

Hazardous and Toxic Materials Contingency Plan

Disposal of material excavated from all hazardous, toxic, and radioactive waste (HTRW) sites discovered within the project limits of the LGRP would require special consideration. The District would develop a contingency plan outlining a course of action in the event that previously unidentified HTRW sites are uncovered during construction. This contingency plan would outline the immediate course of action to follow if HTRWs are uncovered.

Construction-Area Fish Management Program

A worker education program would be undertaken to emphasize the importance of protecting chinook salmon and steelhead trout and their proposed designated critical habitat. Any activity that temporarily diverts flow from any segment of the river would require implementation of the following constraints:

- Before flow is diverted, culverts and siphons will be in place so that flow to river segments downstream of the construction site will not be interrupted.
- Flow will be incrementally diverted from the affected river segment at the upstream boundary, with diversion progressively increasing over a 4-hour period in the following increments: 50%, 75%, 90%, 95%, and 100%. An incremental reduction in flow will allow fish in the affected river segment to move downstream. Sufficient flow will be maintained through bypass channels, culverts, ~~pumps,~~ or siphons employing gravity flow to allow consistent streamflow in the downstream segments and provide unimpeded passage of juvenile chinook salmon and steelhead during construction. Any pumps used for flow diversion would be screened in a manner consistent with the NMFS Fish Screen Criteria for Anadromous Salmonids. Pumping would only occur when other preferred methods (e.g., bypass channels, culverts, or siphons) were determined to be impractical. The use of pumps, if necessary, would be restricted to the June 15 to September 1 period. Bypass channels would be lined with cobble, plastic, or other suitable material to control erosion and prevent the mobilization of fine sediments.
- Adequate fish passage conditions would be met by maintaining contiguous flows, avoiding the creation of vertical drops in excess of 6 inches, and maintaining suitable water velocities (i.e., 8 fps or less) and water depths (minimum of 1 foot).
- All native aquatic vertebrates and larger invertebrates will be moved by a qualified fisheries biologist before dewatering.
- Fish will be removed from pools remaining after flow is diverted from the river segment. A method to capture stranded fish will be developed cooperatively by the District, NMFS, and DFG. Qualified fish biologists will transport captured fish immediately to a flowing segment of the river.

Protocol for capture and release will be developed in cooperation with NMFS, and DFG. Fisheries biologists will contact NMFS immediately if any steelhead or chinook salmon are found dead or injured (except for spawned-out adult chinook salmon).

- ~~If migrating juvenile chinook salmon and steelhead are detected during June and downstream passage may be impeded by construction activities, as determined by a fisheries biologist, a fish trap will be placed above the upstream barrier and operated by a fisheries biologist. Detection of migrating juvenile chinook salmon and steelhead during June will be based on their occurrence during any of the previous 14 days in the ongoing trapping of downstream-migrating fish. The trap at the construction site will be removed if juvenile chinook salmon and steelhead are not captured at the construction site or by the ongoing downstream-migrating fish trapping during 14 consecutive days. All migrating steelhead and juvenile chinook salmon will be removed from the trap every 24 hours, or other appropriate time period that a qualified fish biologist determines necessary to maintain the fish in good condition. Captured fish will be counted, measured, and transported immediately to a flowing segment of the river that allows downstream migration. Additional details of trapping downstream-migrating fish including specific reporting requirements, will be coordinated with NMFS.~~
- Adult chinook salmon are likely to arrive at cofferdam sites before the end of construction on October 15. If necessary, upstream passage for chinook salmon and other salmonids will be provided through or around construction sites from June 15 through September 1 ~~through October 15~~. The need to provide passage will be based on the occurrence of more than 25 adult chinook salmon, flow conditions, and cooperative assessment of passage needs by the District, NMFS, and DFG. After September 1, the District will ensure that coffer dams are constructed to allow for uninterrupted passage of migrating adults around construction sites and dewatered stream reaches. Occurrence of adult chinook salmon ~~will~~ may be based on results of upstream migrant trapping conducted by the District as part of Guadalupe River watershed anadromous fish studies. ~~at an appropriate downstream location, or other method developed cooperatively by the District, NMFS, and DFG.~~

Construction Period Limits

In-channel construction, including riverbank and channel-bed construction, would be limited to the summer low-precipitation period (~~April 15~~May 1–October 15) to reduce the likelihood of adverse effects on rearing juvenile steelhead and chinook salmon and on adult fish migrating to upstream spawning areas. Project construction would also be subject to the following constraints:

- Construction requiring stream dewatering, stream crossings, or work in the channel bed cannot commence before May 1.
- Work can commence on May 1 only if the stream-monitoring criteria are satisfied by that date. Stream monitoring criteria include monitoring to determine whether average daily water temperatures have exceeded 68°F for at least 5 consecutive days. ~~and whether outmigrating salmonids are absent. Absence of juvenile chinook salmon and steelhead during May will be based on observations during the previous 14 days in the ongoing trapping of downstream-migrating fish.~~ Generally, conditions for steelhead and chinook salmon decline when water temperatures exceed 68°F in spring. Specific details pertaining to stream monitoring methodologies, such as monitoring equipment and the frequency and location where monitoring is conducted, and specific reporting requirements, will be coordinated with NMFS and DFG.
- Should stream-monitoring criteria not be met, channel work and stream dewatering will not be allowed to commence until June 1. In the event that in-channel construction occurs from September 1 through October 15, the District will ensure that coffer dams are constructed to allow for uninterrupted passage of migrating adults around construction sites and dewatered stream reaches. ~~If necessary, upstream passage for chinook salmon will be provided through or around construction sites from September 1 through October 15.~~
- The need to provide passage for adult chinook salmon from June 15 through September 1 will be based on the presence of adult chinook salmon, flow conditions, and a cooperative assessment of passage needs by the District, NMFS, and DFG. Construction outside the summer low-precipitation period will require previous approval from DFG and NMFS.
- Bypass channels, culverts, and siphons employing gravity flow will be the primary methods used to divert streamflow. However, if site conditions make it impractical to employ one of these methods, the District may use appropriately screened pumps to divert stream flow. The use of pumps

would be limited to the June 15 to September 1 period to avoid effects on migrating adult and juvenile chinook salmon and steelhead.

Measures to Comply with the Migratory Bird Treaty Act

The LGRP would be constructed inside habitat used by migratory birds. The project would be subject to the following constraints:

- During project construction, the District will not pursue, hunt, attempt to take, kill, capture, collect, possess, or offer for sale any migratory bird, including feathers, parts, nests, or eggs.
- Migratory birds, eggs, and active nests will be avoided by removing potential nesting vegetation inside the construction area boundaries before or after the February 16–July 31 migratory-bird nesting season.
- Barricade fencing erected as part of the Vegetation Protection Plan will protect nesting areas located outside of the construction area boundaries.
- If construction is initiated during the February 16–July 31 migratory-bird nesting season, a qualified biologist will survey the construction area for eggs or young migratory birds just before construction.
- If eggs or migratory birds are found inside the construction area boundaries, the District will develop protective measures and inform DFG of its actions.

Measures to Implement BAAQMD's Feasible Control Measures for PM10 Emissions from Soil Removal Activities

The following list of measures for controlling emissions of PM10 would be implemented during the construction phase of the project. These measures are contained in the BAAQMD's *Feasible Control Measures for PM10 Emissions from Soil Removal Activities* (Bay Area Air Quality Management District 1996a).

- Water all active construction sites at least twice daily.
- Cover all trucks hauling soil, sand, and other loose materials, or require all trucks to maintain at least 2 feet of freeboard.
- Pave, apply water 3 times daily, or apply (nontoxic) soil stabilizers on all unpaved access roads, parking areas, and staging areas at construction sites.
- Sweep daily (with water sweepers) all paved access roads, parking areas, and staging areas at construction sites.

- Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets.

Measures to Address Traffic-Related Effects

The contractor(s) would submit a traffic control plan and would be subject to the following constraints:

- Before the onset of construction, signs with the construction periods clearly displayed will be posted to warn commuters of potential construction delays.
- During construction, signs will be posted at access points to major roadways to notify drivers of alternative routes. This measure will help to divert traffic around potentially congested areas.

Measures to Address Cultural Resources

Because of the documented presence of Native American burial grounds within close proximity of project excavation and construction activities, a monitor representing the Native American community and an archaeologist meeting the Secretary of the Interior's *Standards for Professional Archeologists* would monitor the project during ground-disturbing activities in areas level with or below the foot of the levees. The project would be subject to the following constraints:

- If a prehistoric archaeological site should be discovered, work will stop at the site and the site will be evaluated for significance under National Register of Historic Places (NRHP) criteria.
- If human remains of Native American origin are discovered during project construction, procedures identified in the California public health and safety codes will be followed. These procedures include notifying the county coroner and the Native American Heritage Commission (NAHC). The NAHC will appoint a "most likely descendant" to make recommendations for treatment of the remains. Work in the area will be stopped until the site is treated.
- If prehistoric or historic archaeological sites that appear eligible for the NRHP are discovered, procedures stipulated under implementing regulations for the National Historic Preservation Act (NHPA) (36 CFR 800) will be followed. These procedures will include consulting with the State Historic Preservation Officer (SHPO) to confirm eligibility of the site(s) for the NRHP and development of a memorandum of agreement that specifies treatment for the site(s). Treatment could comprise data

recovery, site avoidance, or possibly capping the site to avoid further impacts.

Contact with Service Providers Before Onset of Construction

The need to reroute or remove any service structures will be accommodated in the project design before the onset of construction. Service providers will be contacted in advance of construction activities so that they can reroute services or notify customers of impending service interruptions.

Noise-Reducing Construction Practices

To avoid significant adverse health effects related to noise, the City has established the following objectives as acceptable noise levels: 55 decibels day-night level (dB-L_{dn}) as the long-term exterior noise level, 60 dB-L_{dn} as the short-term exterior noise level, 45 dB-L_{dn} as the interior noise level, and 76 dB-L_{dn} as the maximum exterior noise level. Noise effects were evaluated based on standards specified in the San Jose General Plan and the Santa Clara General Plan (City of San Jose 1994, City of Santa Clara 1992). In summary, if construction is anticipated to exceed 60 dB-L_{dn} at noise-sensitive land uses, the effect of the project on noise is considered significant.

The District and its contractors will employ the following noise-reducing construction practices:

- All construction will be done between the hours of 7 a.m. and 5 p.m.
- All equipment will have sound-control devices no less effective than those provided on the original equipment, and all equipment will be operated and maintained to minimize noise generation.
- No equipment will have an unmuffled exhaust.
- The District will designate a "noise abatement coordinator" who will be responsible for responding to any local complaints about construction noise. The telephone number of the noise abatement coordinator will be posted at the construction site and included in notices sent to residents within 300 m (1,000 feet) of the lower Guadalupe River regarding the construction schedule. The noise abatement coordinator will determine the cause of noise complaints (e.g., starting too early, bad muffler) and will require that reasonable measures to correct the problem be implemented. The District will be responsible for posting and providing notices of construction schedules to residents, and will give the noise abatement coordinator's name and telephone number to the directors of

the City Department of Planning, Building and Code Enforcement; the City of Santa Clara Planning and Inspection Department; and the Santa Clara County Planning Office.

Measures to Avoid and Minimize Adverse Project Effects during LGRP Operation and Maintenance

The District conducts limited channel maintenance activities on the lower Guadalupe River between I-880 and the UPRR. When all designs, plans, and specifications for the LGRP are finalized, the District would develop a Final Operation and Maintenance Manual (Final O&M Manual) in which to maintain the project elements. This Final O&M Manual would require the District to preserve the as-built design of the LGRP; it would most likely include the maintenance procedures identified in chapter 6 of the Engineer's Report and all mitigation requirements. The District would perform these operation and maintenance responsibilities for the life (100 years) of the project.

As described in chapter 4, "Cumulative Impacts," the District has prepared a programmatic EIR for its SMP that addresses the potential effects of ongoing channel maintenance in the entire Guadalupe River, including the LGRP. Routine maintenance practices, including bank stabilization and removal of sediment and woody debris as described in chapter 4 of the LGRP Engineer's Report, are the only regular maintenance activities that would be required for maintenance of the as-built designs of the river channel specified in the LGRP.

Chapter 3

Environmental Setting, Impacts, and Mitigation Measures

Hydrologic and Hydraulic Conditions

Hydrologic Conditions

Basin Physiography

The Guadalupe River basin is located in Santa Clara County at the south end of San Francisco Bay. The basin covers an area of approximately 414.4 km^2 (160 square miles) above the river's confluence with Coyote Creek near San Francisco Bay and 373 km^2 (144 square miles) above the U.S. Geological Survey (USGS) gaging station on the Guadalupe River in downtown San Jose, located just upstream of the St. John Street Bridge (Guadalupe River at San Jose gage). The basin is bounded on the south by the Diablo Range, on the west by the Santa Cruz Mountains, on the east by Coyote Creek, and on the north by San Francisco Bay. Basin relief is approximately 1,158 m (3,800 feet), with the highest point near Loma Prieta in the Santa Cruz Mountains and the lowest point below sea level near Alviso on San Francisco Bay. The basin is characterized by a perimeter of high, steep, natural slopes with a large, wide valley below.

The Guadalupe River originates at the confluence of Guadalupe and Alamitos Creeks at Almaden Lake on the southern side of San Jose near the intersection of Coleman Road and Almaden Expressway (figure 3-1). From its origin, the river drains north through the heavily populated Santa Clara Valley toward San Francisco Bay. Major tributaries to the Guadalupe River are Ross, Canoas, and Los Gatos Creeks. The Guadalupe River reaches San Francisco Bay near Alviso, where conditions change abruptly from densely urbanized municipal and residential land uses to salt evaporation ponds and tidal sloughs bordered by tidal marsh. The tidal influence of San Francisco Bay extends up the Guadalupe River approximately 10.5 km (6.5 miles) to about Montague Expressway.

The hydrology of the basin has been altered greatly by human activity. In 1929, the Santa Clara Valley Water Conservation District (SCVWCD), the precursor to the current District, was created to supply water and alleviate land surface subsidence in and around San Jose caused by groundwater overdraft. In 1933, the SCVWCD initiated a construction program to build recharge ponds and 5 dams and reservoirs in the Guadalupe River basin. Calero, Almaden, Guadalupe, and Vasona Reservoirs were completed in 1935, and Lexington Reservoir was completed in 1952. These reservoirs and recharge ponds were designed to capture winter rains to recharge groundwater aquifers. The reservoirs have a combined storage capacity of 35,860 af. Although this storage capacity is primarily for water supply, there are some incidental flood protection benefits (Santa Clara Valley Water District 1999a).

Runoff and riverflow conditions have been affected greatly by reservoir operations and changes in land uses. Together, the reservoirs control or regulate runoff from an area of 163 km^2 (63 square miles), which equal nearly 44% of the Guadalupe River basin above the St. John Street gage. About 56% of the Guadalupe River basin above the project area, or 210 km^2 (81 square miles), is not controlled or regulated by the system of dams and reservoirs. Approximately 187 km^2 (72 square miles) of the basin downstream of the reservoirs are largely urbanized; the river and its tributaries have been extensively channelized and leveed for flood conveyance. The remaining 23 km^2 (9 square miles), about 6% of the basin area not controlled by reservoirs, consist of undeveloped lands in the Diablo Range and the foothills of the Santa Cruz Mountains.

Precipitation

The climate of the Santa Clara Valley is characterized by warm, dry summers and mild, moderately wet winters. Summer weather is dominated by sea breezes caused by differential heating between the interior valleys and the coast, while winter weather is dominated by storms from the northern Pacific Ocean that produce nearly all the annual rainfall.

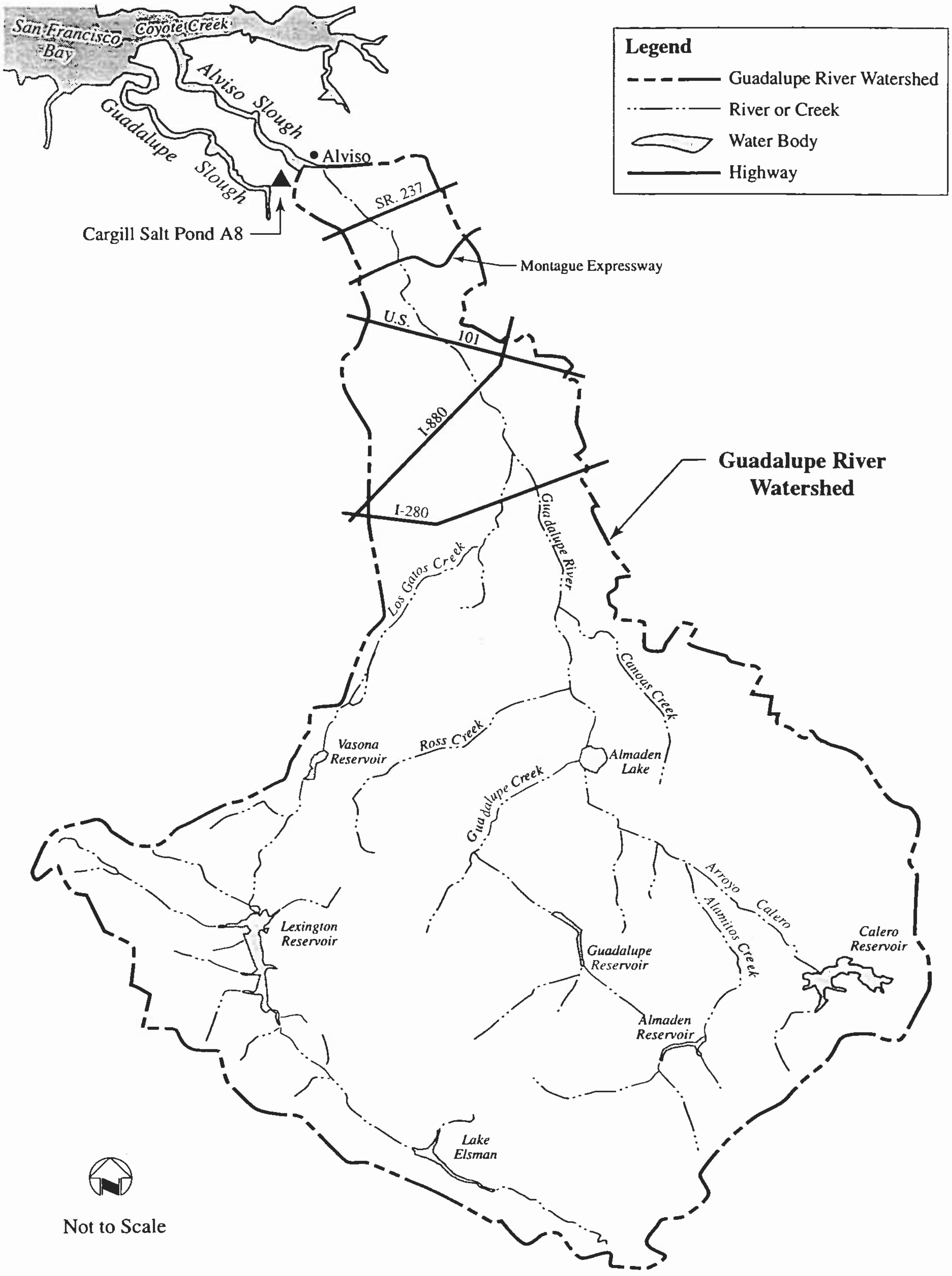


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Figure 3-1. Guadalupe River Watershed

Precipitation data are available from numerous rain gage stations in the Guadalupe River basin, some of which have been in operation for approximately 100 years. Records from precipitation gages located near Los Gatos (12.1 km [7.5 miles] southwest of downtown San Jose), in San Jose, and at Santa Clara University (approximately 4.0 km [2.5 miles] west of downtown San Jose) date back approximately 100 years. The average annual precipitation varies from less than 35.6 cm (14 inches) near San Francisco Bay and 36.0 cm (14 inches) in San Jose to more than 112 cm (44 inches) near the crest of the Santa Cruz Mountains (figure 3-2). The average annual precipitation for the Guadalupe River basin for the period of record is about 51 cm (20 inches). The basin receives 90% of its rain fall in the late fall and winter months; January is usually the wettest month (table 3-1).

Table 3-1. Monthly Average Precipitation for the Guadalupe River Basin

Month	Monthly Precipitation (Percent of Normal Annual Precipitation)
January	21.1
February	16.5
March	14.0
April	8.7
May	2.4
June	0.4
July	0.1
August	0.2
September	0.9
October	4.7
November	11.9
December	19.1

Source: U.S. Army Corps of Engineers 1991.

Existing Runoff and Drainage

The average annual natural runoff past the Guadalupe River at San Jose gage for 1931–60 is estimated to be 35,500 af (U.S. Army Corps of Engineers 1991). Runoff during this period ranged from 0 af in 1931 to more than 123,000 af in 1938, the wettest year on record (U.S. Geological Survey 1999). Historically, the Guadalupe River has experienced significant flow fluctuations in response to the distinct wet and dry seasons. Nearly all surface runoff in the Guadalupe River basin occurs from December through April (table 3-2). The peak flow frequency at the Guadalupe River at San Jose gage near St. John Street Bridge is shown in figure 3-3, and floodflow conditions are described in detail in "Hydraulic Properties" below. Figure 3-3 also shows the range of flows in the Guadalupe River and the frequency with which a given flow is exceeded.

Table 3-2. Distribution of Monthly Natural Average Runoff for the Guadalupe River Basin

Month	Monthly Natural Runoff (Percent of Normal Natural Annual Runoff)
January	19.8
February	32.6
March	20.5
April	10.9
May	0.3
June	0.0
July	0.0
August	0.0
September	0.0
October	0.0
November	1.0
December	14.9

Source: U.S. Army Corps of Engineers 1991.

Low-flow conditions in the tributaries and mainstem of the Guadalupe River have been modified by land use changes, imported water, reservoirs constructed in the upper portions of the basin, and hazardous materials cleanup programs upstream of the project area.

In general, urbanization and the associated increase in impervious surfaces in the form of residential, industrial, and commercial development tend to increase the rates and total quantities of runoff generated within the drainage basin. In the downtown area, where large office buildings have belowground parking, intercepted groundwater is pumped and discharged to the river year round. Summer irrigation from agricultural and residential water uses also increases summer flows.

Flows on the Guadalupe River have been altered by diversions since the late 1800s as a result of early agricultural development in the Santa Clara Valley (Hall 1871). Flows were further altered after 1935, when Calero, Guadalupe, Almaden, and Vasona Reservoirs were completed near the river's headwaters, and in 1952, when Lexington Reservoir was completed. These reservoirs were designed to capture winter rains for groundwater recharge programs, but they are also operated to meet the instream flow requirements described in "Hydraulic Properties" below. Generally, these instream flow requirements are based on the needs of other water rights holders, such as water supply and agricultural users, as well as the needs of fish populations, recreation, and other public trust resources. Flow

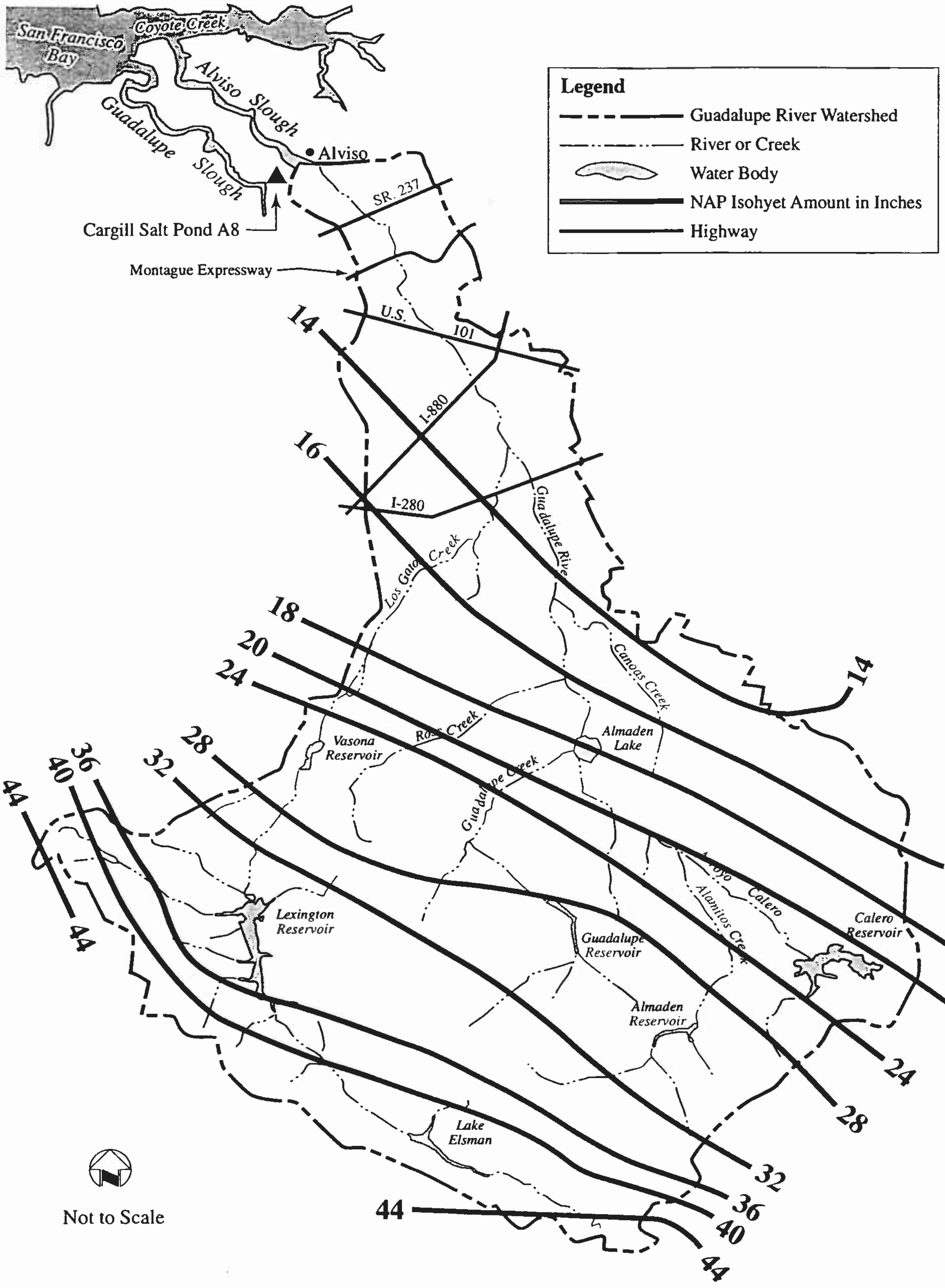

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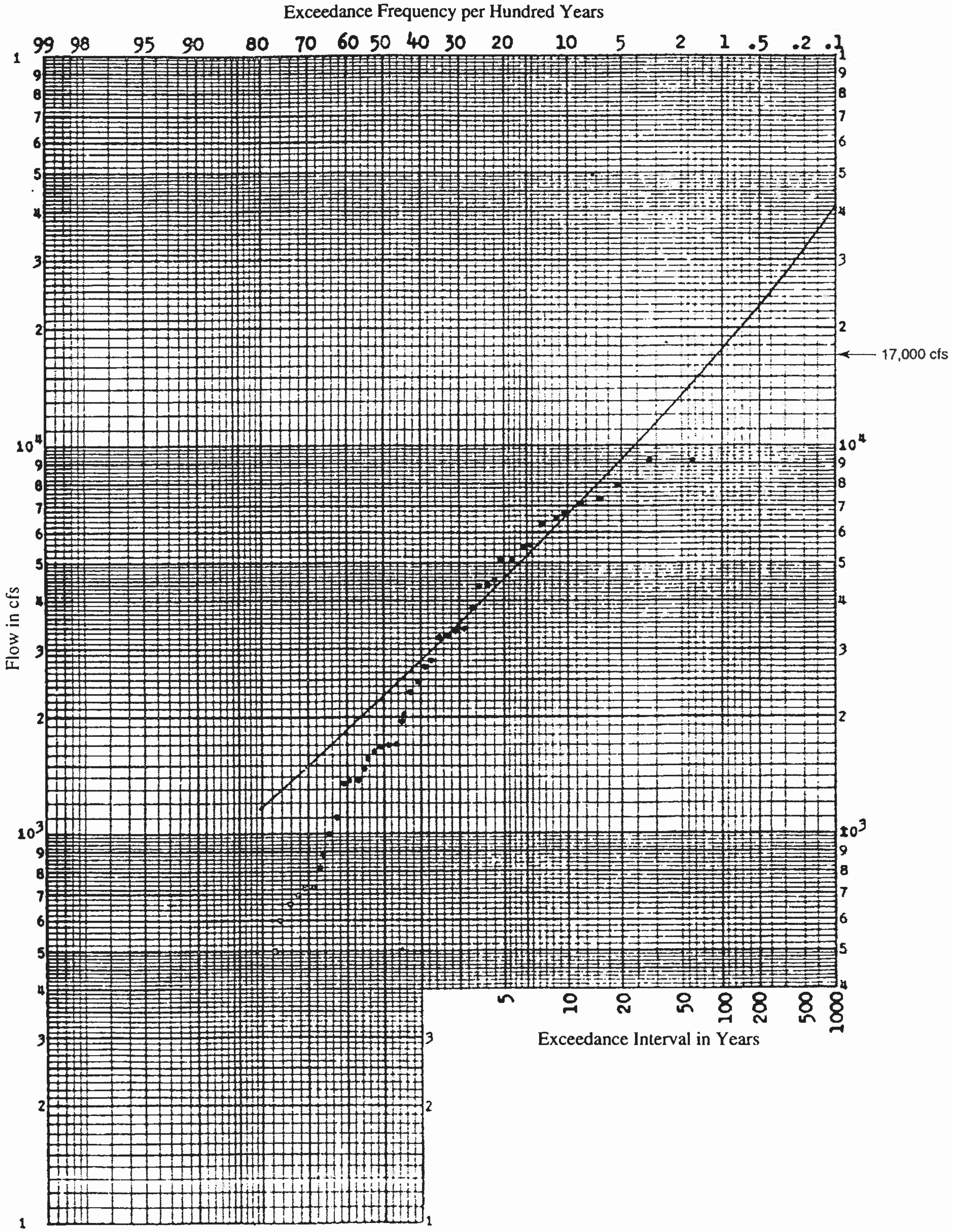
Figure 3-2. Average Annual Precipitation Map



Period of record: 1930-1987
Drainage area: 144 Sq. Mi.

Source: U.S. Army Corps of Engineers 1993.

Figure 3-3. Peak Flow Frequency Curve with the Expected Probability Adjustment for the Guadalupe River at St. John's Street Gage

requirements are adjusted to take into account evaporation and channel losses.

Groundwater recharge ponds are located along the Guadalupe River approximately 8.9 km (5.5 miles) upstream of I-880 and along Guadalupe Creek. Water is released from the reservoirs for diversion into the recharge ponds and to allow groundwater recharge through the streambeds. When the volume of water released from the reservoirs exceeds the recharge capabilities of the recharge ponds and the streambeds, the surplus water flows down the Guadalupe River and beyond the LGRP area.

Flows in the Guadalupe River are also indirectly affected by water imported from the Sacramento–San Joaquin River Delta (Delta) and the Coyote Creek basin. The imported water is delivered to the reservoirs or directly to the recharge ponds through the South Bay Aqueduct of the State Water Project (SWP), the San Felipe Division of the Central Valley Project (CVP), and a pipeline from Anderson Reservoir in the upper Coyote Creek basin.

The District entered into a contract with the SWP in 1961 to deliver 100,000 af of water per year (Santa Clara Valley Water District 1999a). The first deliveries of SWP water were made in 1965. The amount of water delivered each year depends on the amount allocated by the California Department of Water Resources (DWR). The allocation is based on the water-year type.

Construction of the San Felipe Division of the CVP was completed in 1979 for the purpose of delivering water and augmenting existing municipal water supplies for the San Francisco Bay region and surrounding areas. The District began receiving San Felipe water in 1987 and has been receiving 50–75% of the annual CVP allotment of 152,000 af (U.S. Bureau of Reclamation 1994). Because SWP and CVP water is diverted into the previously identified reservoirs or directly to the groundwater recharge basins, some surplus water may flow down the Guadalupe River to the LGRP area (U.S. Army Corps of Engineers 1991); however, because the District's operational goal is to release only the quantity of water that can be effectively percolated through the riverbed, the effects of importing up to 252,000 af of water on streamflow downstream of the recharge ponds are negligible.

From 1983 through 1991, 2,700–16,000 af of water per year were added to the Guadalupe River upstream of the LGRP area. This water came from groundwater pumping conducted as part of a hazardous waste cleanup program at the IBM and Fairchild properties along Canoas Creek.

Groundwater was pumped from contaminated areas, and the pollutants, consisting of various organic compounds, were mechanically removed from the recovered water. The water was then discharged to Canoas Creek. The hazardous waste cleanup program is nearing completion, and base flows in the river have returned to precleanup levels.

In summary, reservoir releases to satisfy the instream flow requirements, groundwater recharge pond capacities, and irrigation and drainage return flows have resulted in altered, and generally higher, flows during the summer months than has been historically experienced.

Table 3-3 shows the monthly distribution of mean daily flows at the USGS Guadalupe River at San Jose gage near the St. John Street Bridge for the period of record from water-year 1954 through water-year 1998. The median (50th percentile) daily streamflows in the low-flow months of May–October have been historically in the range of 0.03 cms (1 cfs) or less. This means that one-half of the time, mean daily flows between May and October have been less than 0.03 cms (1 cfs) and one-half of the time have been greater than 0.03 cms (1 cfs).

Table 3-3. Monthly Distribution of Mean Daily Flows[a] (cfs) in the Guadalupe River at the U.S. Geological Survey Guadalupe River at San Jose Gage, Water-Years 1954–1998

Percentile[a]	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	1	0	0	0	0	0	0	0
30	0	0	0	2	3	2	1	0	0	0	0	0
40	0	1	1	4	6	5	3	1	0	0	0	0
50	1	2	4	8	15	16	5	2	1	1	1	0
60	2	4	8	18	25	31	15	3	2	2	1	1
70	4	8	16	28	61	74	23	6	4	3	2	2
80	8	19	25	82	173	157	54	19	12	10	8	8
90	17	36	73	310	230	409	184	27	21	17	19	17
100	2,460	1,140	4,490	4,460	6,632	7,870	5,150	972	206	104	160	276

[a] Percent of mean daily flows less than the indicated amount.

Source: U.S. Geological Survey 1998.

Minimum Flow Releases

The District does not have strict minimum flow release rates for the reservoirs in the Guadalupe River basin (Aguilera pers. comm.). Instead, the District's reservoir releases are governed by water distribution and recharge capacities, allotments to downstream water rights holders, the requirement to maintain fish populations under Fish and Game Code Section 5937, and flood protection release rules. Because the purpose of the reservoirs is to store winter runoff to recharge the groundwater that provides potable water supplies to the Santa Clara Valley, the District's operational goal is to release only water that can be used in its recharge operations or to meet the mandated flow requirements.

The District is required to release all natural inflows to the reservoirs outside of their diversion periods to provide riparian water rights holders their water entitlement (Aguilera pers. comm.). The periods during which the District is allowed to capture water in the reservoirs are as follows:

Almaden Reservoir	December 1–April 30
Calero Reservoir	December 1–April 30
Guadalupe Reservoir	December 1–April 30
Lexington Reservoir	November 1–May 15
Vasona Reservoir	December 1–June 1

The District is required by Section 5937 of the Fish and Game Code to maintain fish in "good" condition below its dams. To meet this requirement while also maximizing its groundwater recharge capabilities, the District attempts to keep the creeks wet below the dams to at least the point at which streamflows can be augmented by other sources. As a guideline, this requires approximate minimum flows from each of the following dams as listed below (Aguilera pers. comm.).

- Guadalupe Dam, 0.08 cms (3 cfs);
- Calero Dam, 0.05 cms (2 cfs);
- Almaden Dam, 0.08 cms (3 cfs);
- Lenihan Dam (the dam that creates Lexington Reservoir), 0.08 cms (3 cfs) ; and
- Vasona Dam, 0.23–0.28 cms (8–10 cfs).

However, additional releases from either the reservoirs or the other sources are required to maintain flows in the creeks to their confluence with the Guadalupe River. For example, when releases from Calero Reservoir to Arroyo Calero are at the minimum level, the District needs to augment the flow with increased releases from Almaden Reservoir to Alamitos Creek to maintain a flow below the confluence of these 2 streams that would reach the Guadalupe River. The minimum flows indicated previously would provide flow to only the confluence of Alamitos Creek with Arroyo Calero; additional releases from either Calero or Almaden Reservoir would be required to maintain flows to the confluence with the Guadalupe River.

The District has been named in a complaint filed before the SWRCB for violations of the California Fish and Game Code, the California Water Code, and Public Trust Doctrine related to the District's incremental contribution to the cumulative impacts on chinook salmon and steelhead and their habitat within the river and creeks. To address this complaint, the District and DFG have jointly initiated the Fisheries and Aquatic Habitat Collaborative Effort (FAHCE). The FAHCE will identify factors limiting steelhead and chinook salmon populations in the Guadalupe River, Coyote Creek, and Stevens Creek watersheds. Both flow and nonflow measures will be considered by the FAHCE when the complaint is addressed. The FAHCE study, which is described in greater detail in chapter 4, "Cumulative Impacts," is expected to be completed in 2001.

When the reservoirs approach maximum capacity, the District also releases water in an attempt to reduce the magnitude and duration of flows over the emergency spillways of the dams. Flood-release operating rules, or curves, have been developed for each reservoir. Water is released from the reservoirs based on storage levels, rates of inflow, and weather forecasts to prevent uncontrolled spilling that could damage the dams. Although the flood-release curves may provide some incidental flood protection to the valley floor, their primary purpose is to protect the safety of the dams. When the reservoirs are full, excess water is spilled to the Guadalupe River and its tributaries.

Historical and Recent Flooding

Historically, the Guadalupe River has frequently flooded. The annual peak discharges on the Guadalupe River are shown in figure 3-4. Flooding was recorded as early as 1889, and major flooding occurred in 1911, 1941, 1945, 1952, 1955, 1958, 1963, 1967, 1982, 1983, 1986, 1995, 1997, and 1998. There were 2 floods in 1982 and 2 in 1995. The damage from flooding was most extensive in 1958, when instantaneous peak flows reached 259 cms (9,150 cfs). In 1963, voters passed a $12.75 million bond for flood protection in the North Central Flood Control Zone, which encompasses portions of San Jose and Santa Clara and unincorporated portions of Santa Clara County, including the town of Alviso (Santa Clara Valley Water District 1999a). Improvements funded by the bond consisted of channel modifications, bank and channel bed stabilization, and levee construction.

During the most substantial recent floods in January and March of 1995, the Guadalupe River overtopped its banks in the neighborhoods between Willow Glen Way and Interstate 280 (I-280). There was also significant flooding in the immediate vicinity of the LGRP area downstream of I-280. Along the

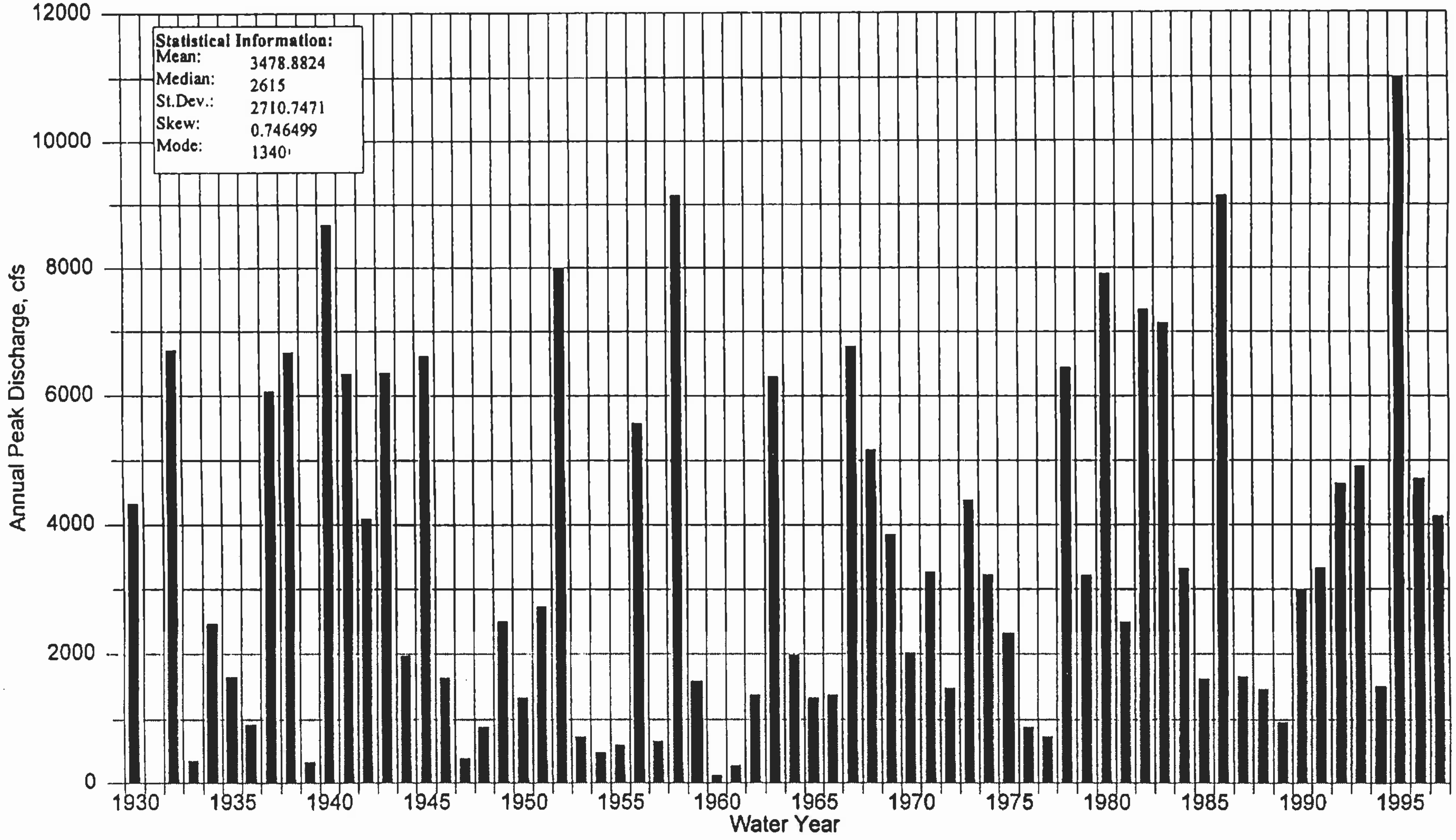


Figure 3-4. Guadalupe River Annual Peak Discharge at St. John's Street Gage

lower Guadalupe River, the community of Alviso and Cargill Salt Ponds A8D, A8W, A5, and A7 were also flooded. Because the river overflowed its banks upstream of the San Jose gage, there are no measured data showing maximum flows; however, based on high-water marks and hydraulic modeling, floodflows most likely exceeded 300 cms (11,000 cfs) in March 1995. Based on figure 3-3, the January 1995 flood has a recurrence interval of ~~25~~ 35 years.

Present Flood Risk

In the LGRP area the 100-year floodplain of the Guadalupe River delineated by the Federal Emergency Management Agency (FEMA) is at least 1.5 km (0.93 mile) wide and in many areas is greater than 2.0 km (1.2 miles) wide (figure 3-5). The community of Alviso and the Cargill Salt Ponds are susceptible to flooding from the Guadalupe River, and to Coyote Creek floodflows and tidal flooding from San Francisco Bay. The community of Alviso is subject to Guadalupe River flooding from the south and northwest. Floodwaters overtopping the most vulnerable portions of the Guadalupe River levee system would flow north along North First Street to Alviso, as would internal drainage that cannot be pumped into the Guadalupe River. Levees surrounding the Santa Clara County Marina northwest of Alviso are also vulnerable to overtopping, which would result in the flooding of Alviso. Floodflows from Coyote Creek, which can flow west through New Chicago Marsh and the Rincon de Los Esteros area, pose another risk of inundation for Alviso. High tides in San Francisco Bay also pose a flood risk to that community.

Calculation of the Design Flood

The design flood hydrograph for the Guadalupe River basin was based on hydrologic studies conducted by the Corps in the late 1970s (U.S. Army Corps of Engineers 1977) and application of the Corps' Hydrologic Engineering Center (HEC) flood hydrograph model, HEC-1 (U.S. Army Corps of Engineers 1991). This model calculates the basin response to a storm event and provides hydrographs for selected points in the basin. Precipitation data from the Los Gatos, San Jose, and Santa Clara University gages were used to develop the design storm precipitation distribution in the watershed for the model.

The peak design floodflow on the Guadalupe River immediately upstream of Los Gatos Creek in downtown San Jose has been calculated at 413 cms (14,600 cfs) (U.S. Army Corps of Engineers 1991). Based on the history of past reservoir operations, the HEC-1 modeling included the assumption that

Almaden, Guadalupe, and Calero Reservoirs would be only partially full before the design storm and would provide some incidental flood protection (figure 3-1). At the start of the design storm event, Lexington Reservoir is 10,000 af below the maximum storage capacity at the spillway. With this amount of storage available in the reservoir, flows in Los Gatos Creek at the Guadalupe River would peak at 220 cms (7,800 cfs) 6 hours after the peak on the Guadalupe River. The resulting design flood hydrograph has an instantaneous peak flow of 481 cms (17,000 cfs), and flows exceeding 439 cms (15,500 cfs) would last nearly 12 hours (figure 3-6).

These flows represent only the volume of runoff generated during the storm event. They do not represent the flows that would actually be confined within the channels at these locations because the capacity of the channels is limited. Portions of the calculated peak flow would overtop the channel banks and cause flooding of the adjacent floodplains. Existing channel capacities are described in "Hydraulic Properties" below. The HEC-1 model shows that the timing of the peak floodflows at the confluence of the Guadalupe River and Los Gatos Creek is a function of the amount of storage space available in Lexington Reservoir on Los Gatos Creek.

In preparing the EIR/EIS for the Downtown Guadalupe River Project (U.S. Army Corps of Engineers 2000), the Corps reviewed the design peak floodflows, taking into consideration the flooding and the land use changes that had occurred since completion of the 1977 hydrology study. The Corps' analysis concluded that the 1977 hydrology properly reflects future upstream channel improvements and urbanization. The Corps also determined that the flood routings and rainfall loss rates are still valid and properly reflect prevailing conditions. Consequently, the Corps has determined that the design floodflow of 481 cms (17,000 cfs) at St. John Street accurately reflects the peak flow likely to enter the LGRP area from upstream.

Hydraulic Properties

A model of existing hydraulic conditions was developed using the HEC-RAS river analysis model to evaluate sedimentation issues in the lower Guadalupe River (Northwest Hydraulic Consultants 2000). For the purposes of CEQA and NEPA analysis, preliminary estimates of the river's hydraulic properties were made for the 100-year flood and more frequent flood events.

Figure 3-7 is a diagram of existing channel capacities; it shows areas where the channel would not currently be capable of conveying the design floodflow. Figures 3-8 and 3-9 show the mean channel velocities and the

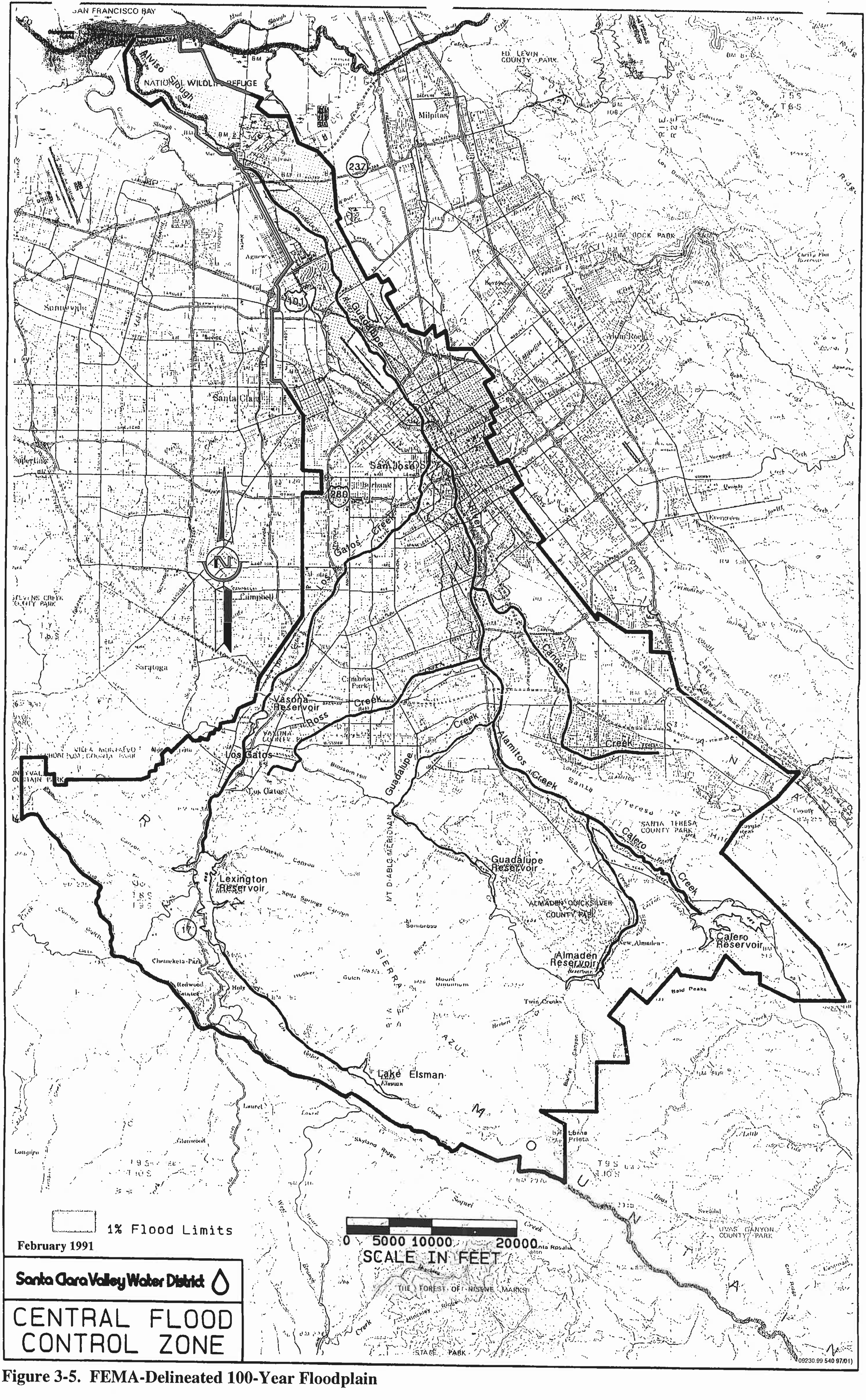
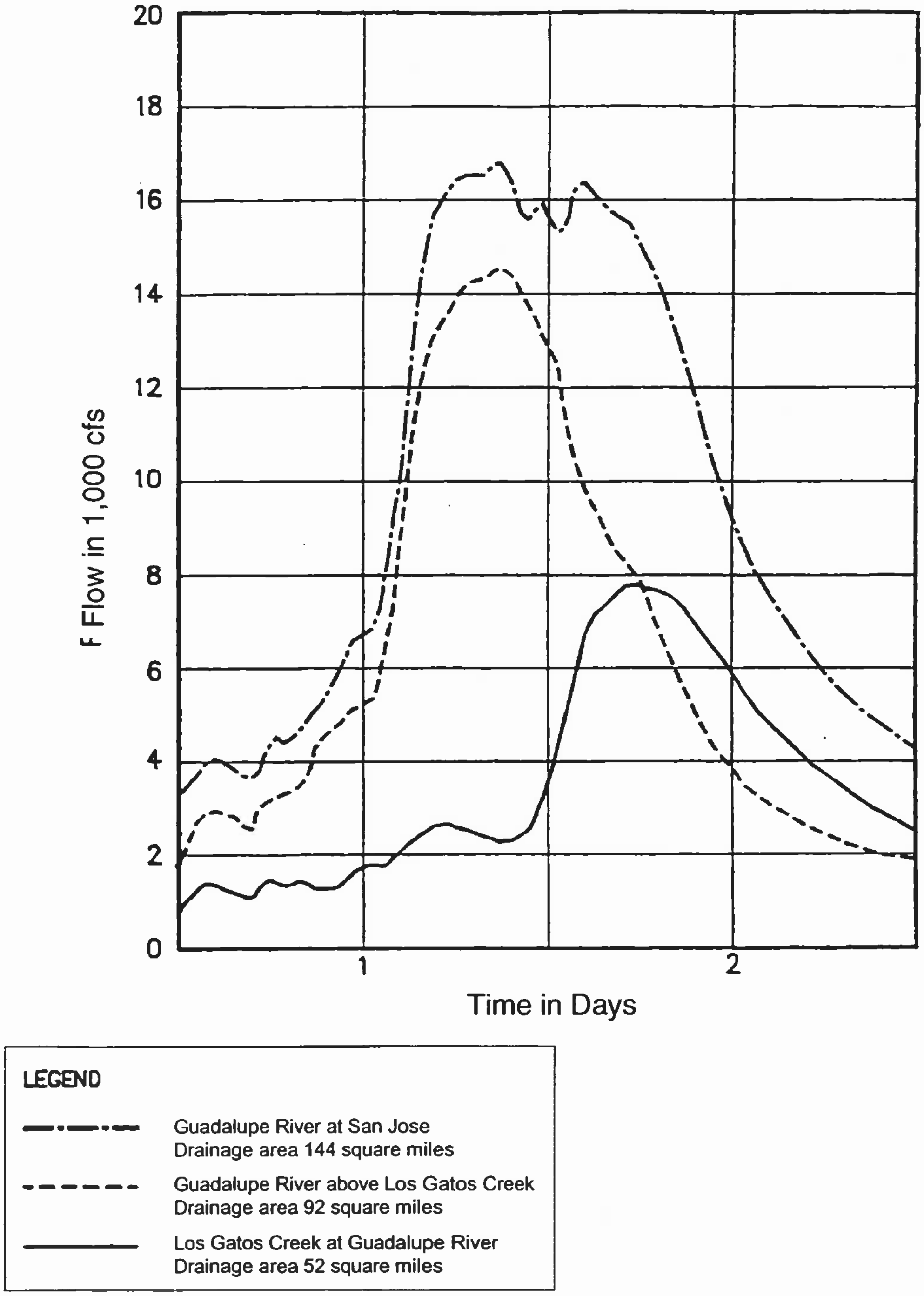
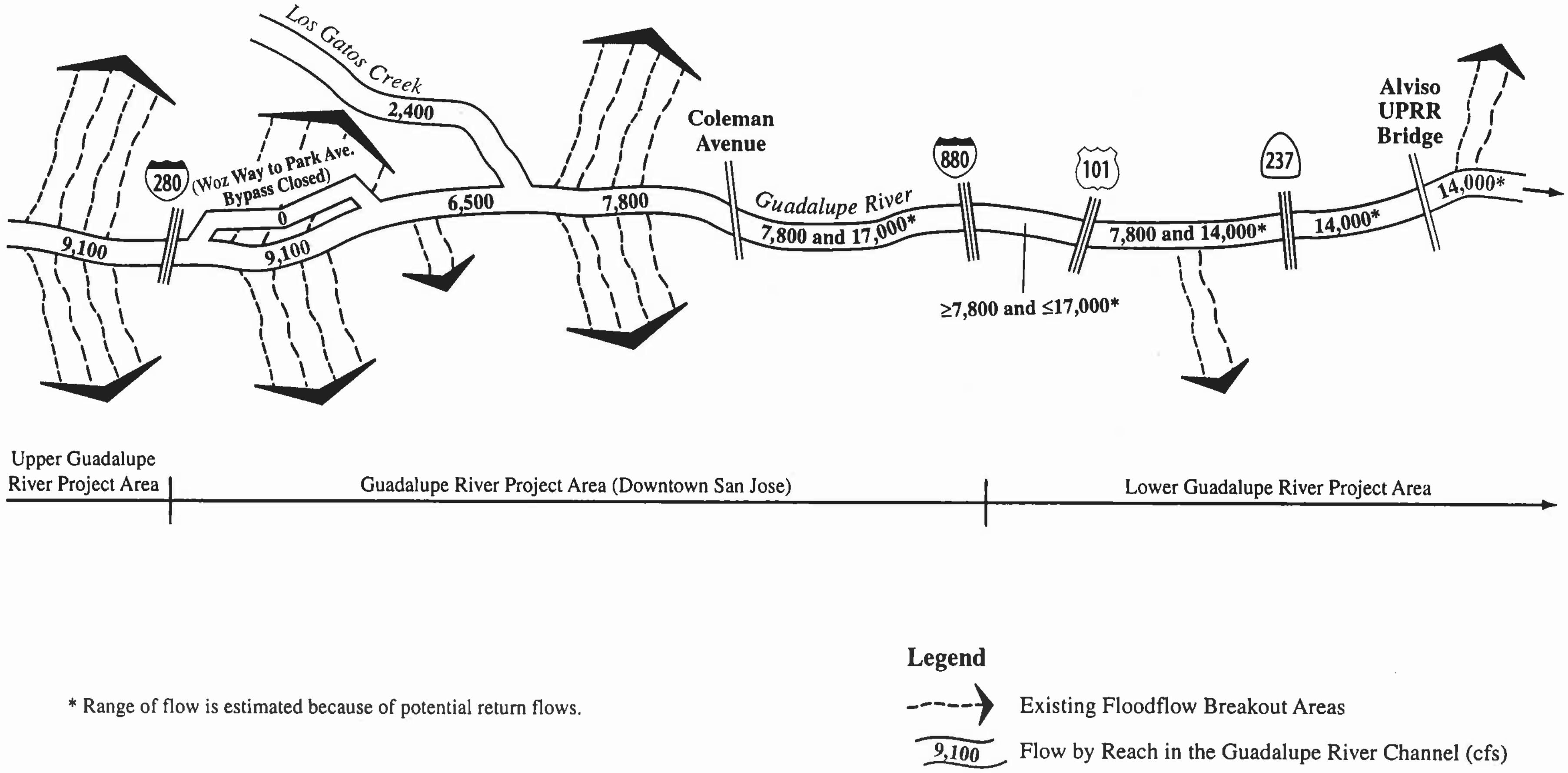


Figure 3-5. FEMA-Delineated 100-Year Floodplain



Note: Flow in Guadalupe River at San Jose is representative of combined flows of the 2 individual flows in Guadalupe and Los Gatos Creeks.

Figure 3-6. Design Flood Hydrographs


Los Gatos Creek
2,400
280
(Woz Way to Park Ave. Bypass Closed)
0
9,100
9,100
6,500
7,800
Coleman Avenue
Guadalupe River
7,800 and 17,000*
880
≥7,800 and ≤17,000*
101
7,800 and 14,000*
237
14,000*
Alviso UPRR Bridge
14,000*
Upper Guadalupe River Project Area
Guadalupe River Project Area (Downtown San Jose)
Lower Guadalupe River Project Area
Legend
Existing Floodflow Breakout Areas
9,100
Flow by Reach in the Guadalupe River Channel (cfs)

* Range of flow is estimated because of potential return flows.

Source:

100-year design floodflow is based on U.S. Army Corps of Engineers (1993).

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Figure 3-7. Existing Flows in the Guadalupe River at the Peak of the 100-Year Design Floodflow

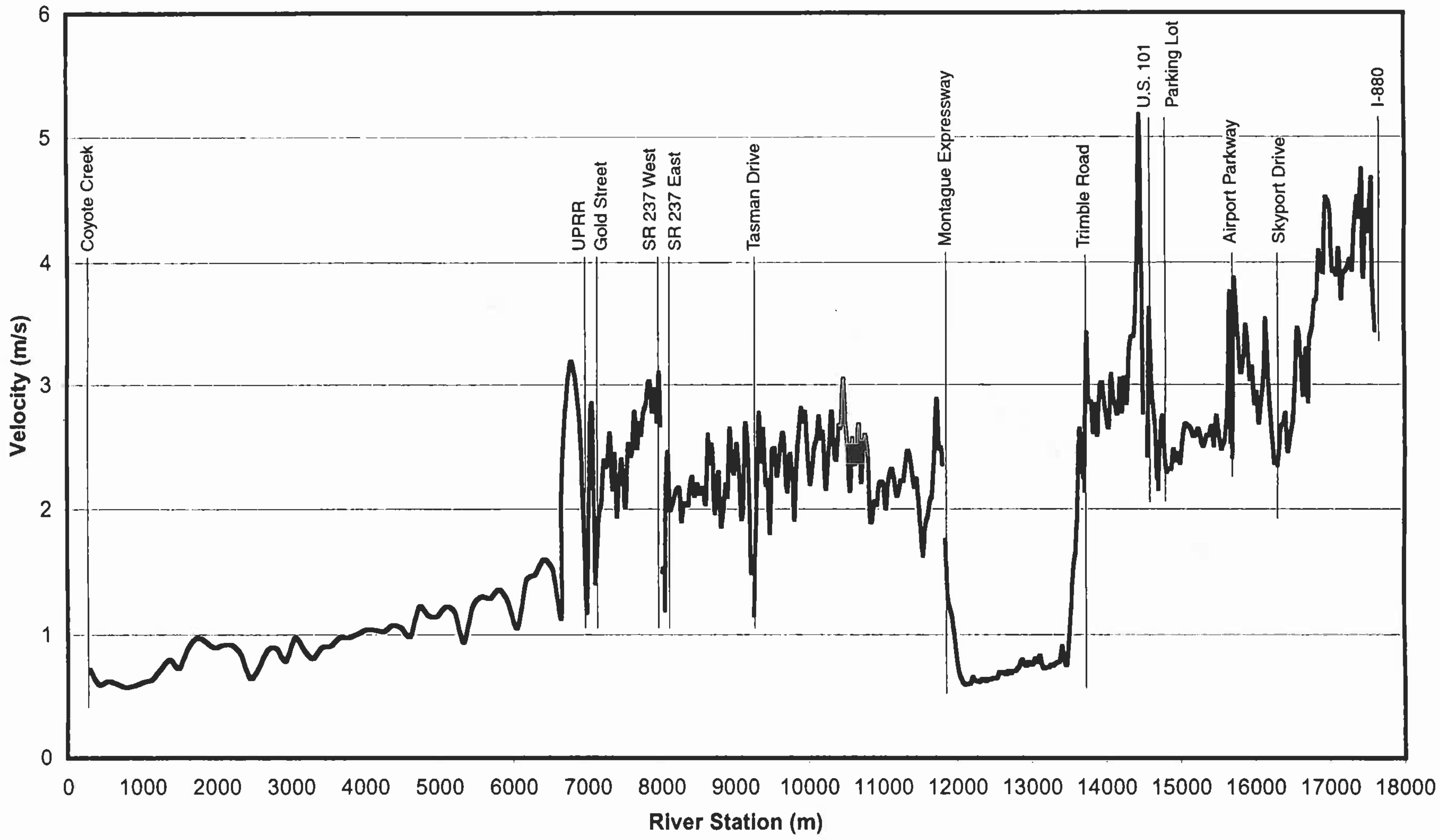

Figure 3-8. Mean Channel Velocity During the Design Flood Event - Existing Condition

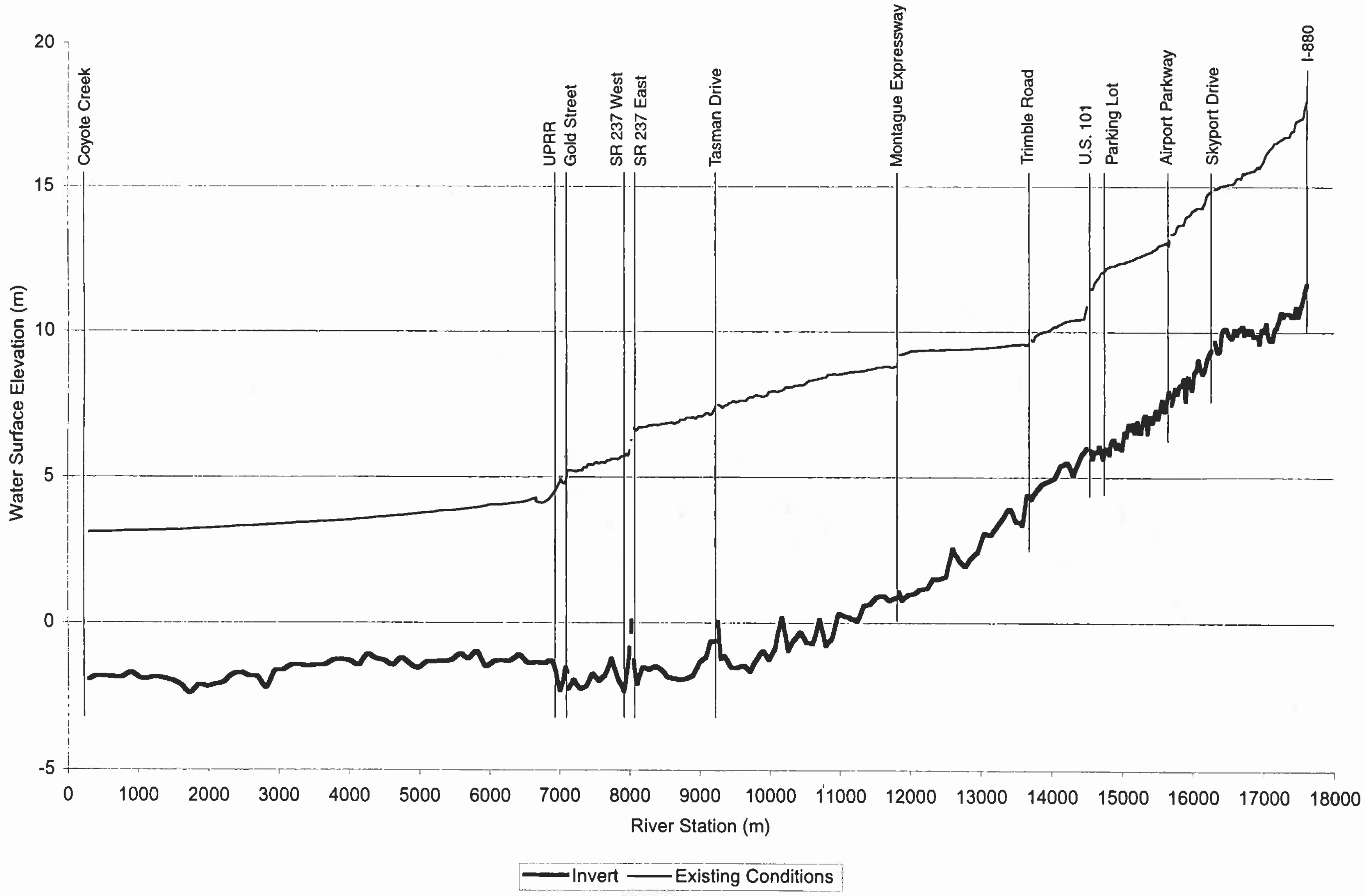

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Figure 3-9. Water Surface Elevations During the Design Flood Event - Existing Conditions

water surface elevation that would be present in the lower Guadalupe River. The data are based on the assumption that all flow would be contained within a hypothetical channel that vertically extends the existing channel banks.

Methods and Significance Criteria

Assessment of flooding impacts that could result from implementing alternatives under the LGRP was based on the assumptions listed below. The assessment assumed the design floodflow for the Guadalupe River basin developed by the Corps using the HEC-1 flood hydrograph model.

- The quantity of flow in the Guadalupe River during storm events depends on rainfall, runoff, and storage factors in the watershed that would remain independent of the LGRP.
- The LGRP would be constructed to convey a design floodflow rate of 481 cms (17,000 cfs) as required by the LCA between the Corps and the District.
- Local runoff (in addition to the LGRP's 481-cms [17,000-cfs] design flows) from San Jose and Santa Clara that is currently pumped to the lower Guadalupe River. ~~is addressed by the Cities of San Jose and Santa Clara and the District as a separate localized drainage project. A separate emergency pump operations agreement is being developed that would address the procedures for local pumping to the lower Guadalupe River during flood events. This related project is~~ These additional flows into the river are addressed in chapter 4, "Cumulative Impacts."

The analyses of the hydraulic effects of each alternative were developed using the HEC-RAS, a river analysis model for gradually varied steady flow (Northwest Hydraulic Consultants 2001). The hydraulic analysis was a feasibility-level analysis used for planning. After the design has evolved from a concept to engineering drawings, more detailed hydraulic modeling will be completed. The planning-level hydraulic model developed for the LGRP includes the area from I-880 downstream beyond the limits of the project, at the UPRR bridge, to the mouth of Alviso Slough.

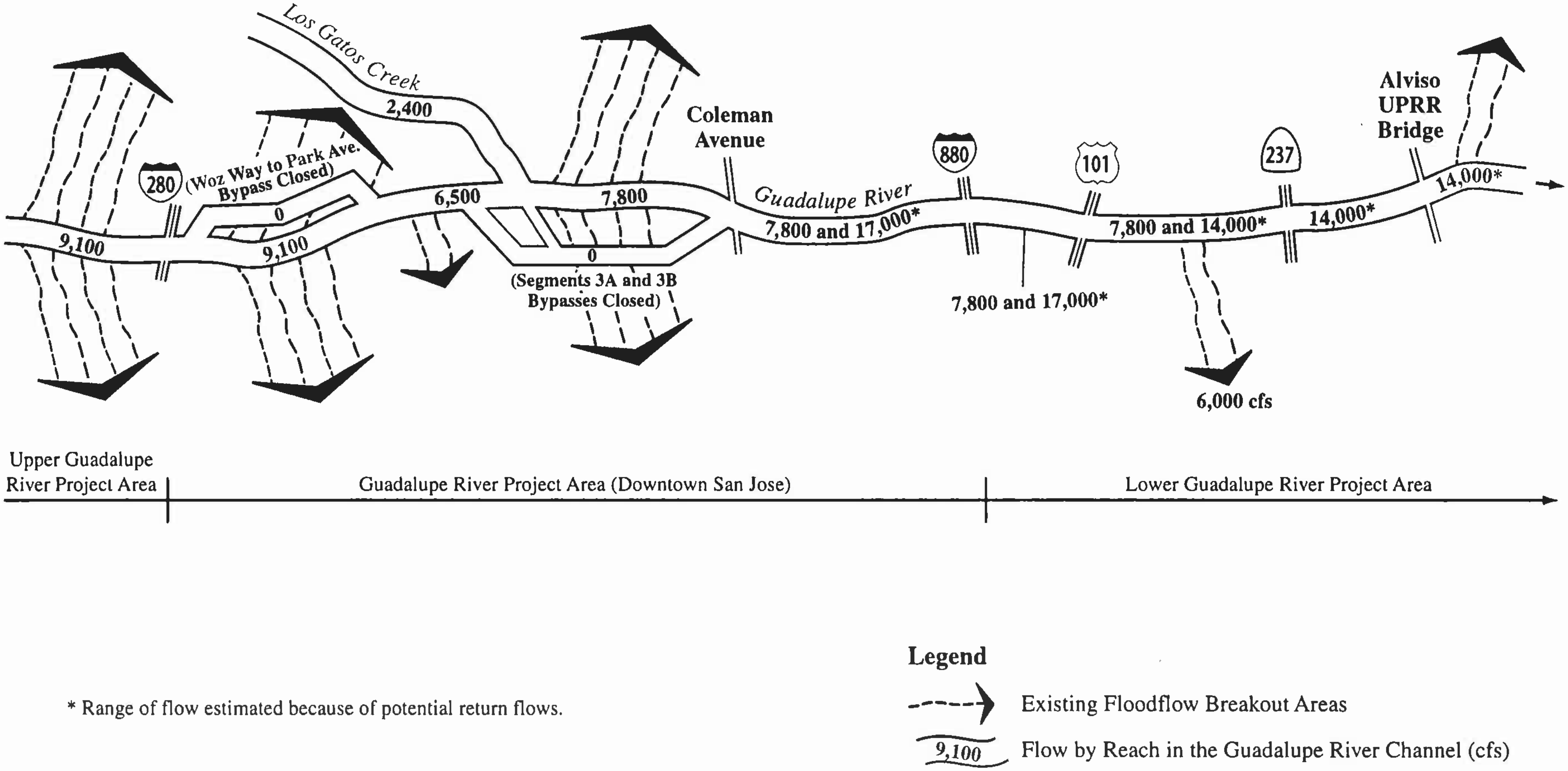
The following criteria were used to evaluate the significance of hydrologic and hydraulic impacts. These criteria are based on the State CEQA Guidelines, the District's guidelines, and professional judgment. A project would have a significant impact on hydrologic and hydraulic conditions if it would:

- substantially alter the existing drainage pattern of the area or substantially increase the amount of runoff in a manner that would result in on-site or off-site flooding;
- result in increased runoff volumes or rates or alteration of drainage patterns that would cause downstream or off-site drainage problems;
- increase the risk or severity of flooding in downstream areas;
- create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems; or
- expose people or structures to significant loss, injury, or death resulting from flooding.

The impact analysis below assumes a 17,000 cfs floodflow. Potential impacts associated with the additional 1,350 cfs of interior drainage entering the Guadalupe River are addressed in chapter 4, "Cumulative Impacts."

Alternative 1: No Project

Under the No-Project Alternative, it is assumed that the District would continue its current level of maintenance practices, in effect since 1992, to maintain the channel. The HEC-RAS analyses show that under the No-Project Alternative, the floodwaters would not be contained in the river channel during the design floodflow and that portions of San Jose and Alviso would flood. Figure 3-10 depicts the flows that would exist in the Guadalupe River at the peak of the design floodflow under the No-Project Alternative. As shown in the figure, the lower Guadalupe River would contain approximately 396 cms (14,000 cfs) and approximately 170 cms (6,000 cfs) would flow overland along North First Street to Alviso. Overland flows, consisting of both floodwaters that had overtopped the Guadalupe River levees and local runoff, would cause floodwaters to reach a depth of 2.2 m (7.2 feet) in Alviso. Under the No-Project Alternative, the upper and downtown Guadalupe River projects would not be allowed to operate because capacity to convey the design floodflows would not exist in the lower Guadalupe River. Impacts associated with operation of the upper and downtown projects would not occur.


Los Gatos Creek
2,400
280
(Woz Way to Park Ave. Bypass Closed)
0
9,100
9,100
6,500
7,800
0
(Segments 3A and 3B Bypasses Closed)
Coleman Avenue
Guadalupe River
7,800 and 17,000*
880
7,800 and 17,000*
101
7,800 and 14,000*
6,000 cfs
237
14,000*
Alviso UPRR Bridge
14,000*
Upper Guadalupe River Project Area
Guadalupe River Project Area (Downtown San Jose)
Lower Guadalupe River Project Area
Legend
Existing Floodflow Breakout Areas
9,100
Flow by Reach in the Guadalupe River Channel (cfs)

* Range of flow estimated because of potential return flows.

Source:

100-year design floodflow is based on U.S. Army Corps of Engineers (1993).

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Figure 3-10. Flows in the Guadalupe River at the Peak of the 100-Year Design Floodflow – No-Project Alternative

Alternative 2: Floodwalls/Levee Raise (Proposed Project)

Impact: Reduction in the Potential for Flooding in San Jose and Santa Clara

The HEC-RAS modeling results show that, under the Proposed Project, the LGRP would be able to convey the design floodflow of 481 cms (17,000 cfs) with the required freeboard between the I-880 and the UPRR bridges. Implementing this alternative would increase the conveyance capacity of the lower Guadalupe River from 396 cms (14,000 cfs) to 481 cms (17,000 cfs). The increased conveyance capacity would reduce the potential for upstream flooding and allow operation of the upstream flood protection projects in downtown San Jose and along the upper Guadalupe River. Figure 3-11 depicts the design floodflow and channel conveyance capacities that would exist with this alternative. Figure 3-12 shows reduction in flood stage as a result of the Proposed Project. This impact is considered beneficial. No mitigation is required.

Impact: Potential for Downstream Flooding Induced by the LGRP

The Proposed Project would allow the LGRP to convey the design floodflow of 481 cms (17,000 cfs) through the LGRP reaches and would reduce the potential for flooding upstream in downtown San Jose and farther upstream along the upper Guadalupe River. The ability to convey 481 cms (17,000 cfs) under the LGRP could affect the magnitude and duration of flooding downstream of the project in Alviso, at the Cargill Salt Ponds, and New Chicago Marsh.

Under existing conditions, the capacity of the lower Guadalupe River channel is approximately 396 cms (14,000 cfs) at the UPRR bridge and the channel capacity in Alviso Slough is approximately ~~193 cms (6,800 cfs)~~ 283–311 cms (10,000–11,000 cfs). These current conveyance capacity conditions result in flooding in Alviso and the Cargill Salt Ponds when lower Guadalupe River floodflows exceed the capacity of Alviso Slough. Floodflows in excess of 193 cms (6,800 cfs) currently break out of the banks of Alviso Slough downstream of the UPRR crossing in the vicinity of Cargill

Salt Pond A8W. In this area, the levee on the west bank of Alviso Slough has failed under previous flood events and acts as an informal, uncontrolled weir. Floodflows also flow east over the Alviso Marina levee into the town of Alviso.

To study the hydrodynamics of the baylands and the flooding problems in Alviso, the District initiated a reconnaissance-level study of the baylands. A central element of the study was the development of an unsteady-flow network (UNET) model. The Engineer's Report provides a detailed discussion of the hydraulic modeling efforts including the assumptions and methods used in conducting the evaluation (Northwest Hydraulic Consultants 2001).

Under the Proposed Project, the LGRP would increase the lower Guadalupe River channel design capacity to 481 cms (17,000 cfs) at the UPRR crossing. Table 3-4 shows the depths of flooding estimated by the UNET model. The results indicate that the proposed increase in lower Guadalupe River channel capacity could exacerbate the current flooding conditions in the Cargill Ponds downstream of the LGRP in the baylands study area.

Under the LGRP, flooding depths in Alviso and New Chicago Marsh would be expected to decrease by approximately 0.9 m (2.9 feet) from current conditions because of reduced overland flooding (upstream levee overtopping) from upgradient areas in San Jose. However, the flooding contribution from the Guadalupe River overtopping the marina parking lot would increase (Northwest Hydraulic Consultants 2001).

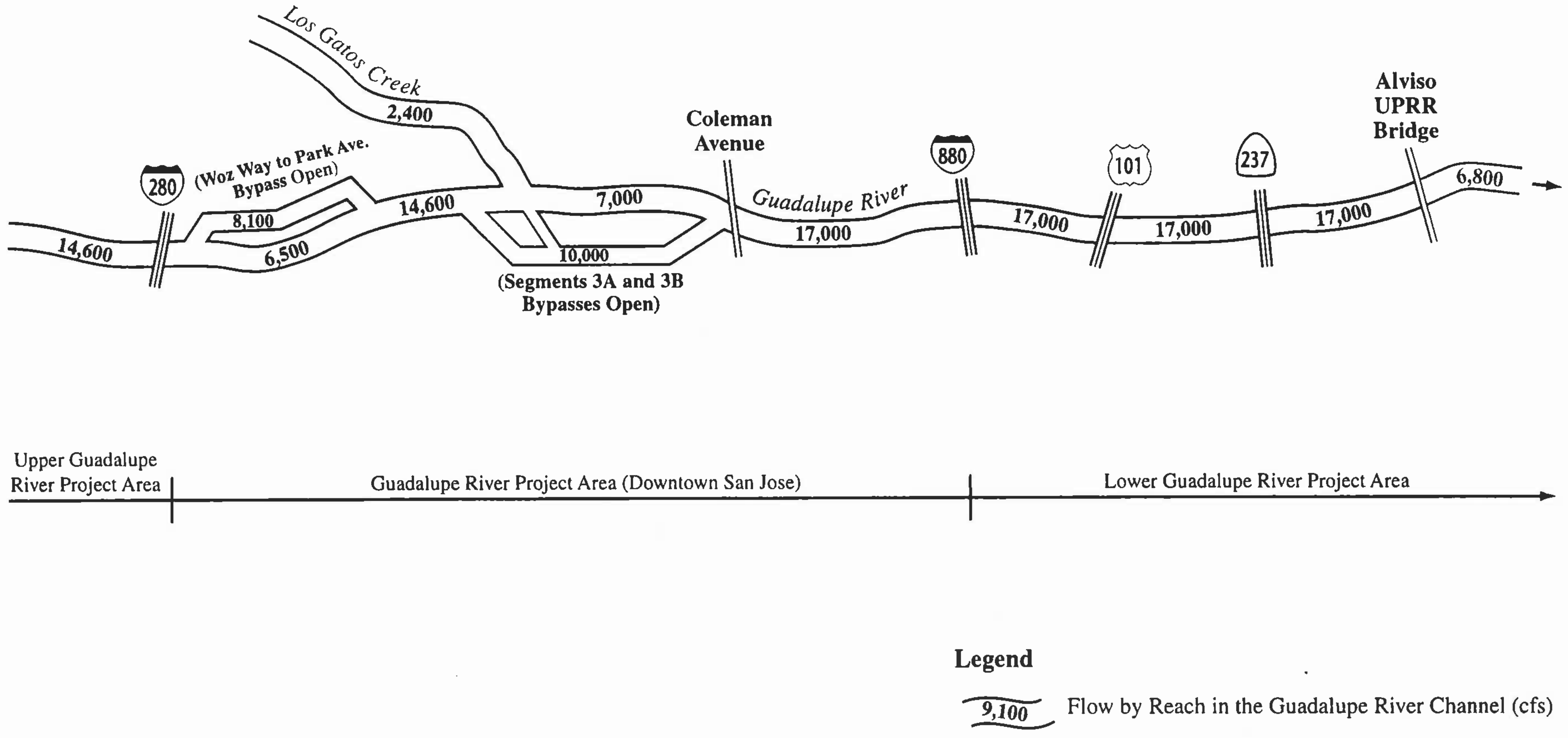
Flooding depths in Cargill Salt Ponds A5, A7, A8D, and A8W would increase by up to approximately 0.3 m (1 foot) ~~0.4 m (1.8 feet)~~ compared to existing conditions. ~~Flood depths in Cargill Salt Ponds A12, A13, and A15 would decrease by approximately 0.1 m (0.3 feet).~~

Table 3-5 shows the volume of floodwater, based on the UNET model, that would be captured in each of the baylands areas. There would be increased flood volumes ranging from 15% to 21% in the salt ponds west of Alviso Slough (A3E, A5, A7, A8D, and A8W). ~~Under the Proposed Project, the flood volume would be reduced by 26% in Alviso, 94% in Rincon de los Esteros, and 7%-24% in the salt ponds east of Alviso Slough. However,~~

Table 3-4. Estimated Depths of Flooding in the Baylands under Existing Conditions and under the Proposed Project

Baylands Area	Existing Conditions	Proposed Project
Design Floodflows		
Design Event	Scaled LCA 4-day Hydrograph	LCA 4-day Hydrograph
Peak Discharge	396 cms (14,000 cfs)	481 cms (17,000 cfs)
North First Street	170 cms (6,000 cfs)	85 cms (3,000 cfs)
Estimated Depth of Flooding in Meters (Feet)		
Rincon de los Esteros	1.0–1.9 (3.4–6.2)	0.6–1.2 (1.9–3.8)
Alviso	2.2 (7.2)	1.3 (4.3)
New Chicago Marsh	2.2 (7.2)	1.3 (4.3)
Cargill Pond A3E	0.02 (0.07) ~~0.3 (0.1)~~	0.03 (0.11) ~~0.3 (0.1)~~
Cargill Pond A3W	0.003 (0.01)~~0.0 (0.0)~~	0.003 (0.01) ~~0.0 (0.0)~~
Cargill Pond A5	1.81 (5.95) ~~1.8 (5.8)~~	2.20 (7.21) ~~2.1 (7.0)~~
USFWS Refuge (A6)	0.0 (0.0)	0.0 (0.0)
Cargill Pond A7	1.83 (5.99) ~~1.8 (5.8)~~	2.21 (7.25) ~~2.2 (7.1)~~
Cargill Pond A8D	1.80 (5.90) ~~1.8 (5.8)~~	2.19 (7.17) ~~2.1 (7.0)~~
Cargill Pond A8W	2.52 (8.27) ~~2.5 (8.1)~~	2.91 (9.54) ~~2.9 (9.4)~~
Cargill Pond A9	0.0 (0.0)	0.0 (0.0)
Cargill Pond A10	0.0 (0.0)	0.0 (0.0)
Cargill Pond A11	0.0 (0.0)	0.0 (0.0)
Cargill Pond A12	0.6 (2.1)	0.5 (1.6)
Cargill Pond A13	0.08 (0.26) ~~0.8 (2.5)~~	0.08 (0.26) ~~0.6 (1.9)~~
Cargill Pond A14	0.0 (0.0)	0.0 (0.0)
Cargill Pond A15	0.16 (0.51) ~~0.4 (1.4)~~	0.16 (0.51) ~~0.4 (1.4)~~
Cargill Pond A16	0.0 (0.0)	0.0 (0.0)
Cargill Pond A17	1.38 (4.56) ~~1.0 (3.3)~~	1.38 (4.56) ~~1.0 (3.3)~~

Source: Northwest Hydraulic Consultants 2001.


Los Gatos Creek
2,400
280
(Woz Way to Park Ave. Bypass Open)
8,100
6,500
14,600
14,600
7,000
10,000
(Segments 3A and 3B Bypasses Open)
Coleman Avenue
Guadalupe River
17,000
880
17,000
101
17,000
237
17,000
Alviso UPRR Bridge
6,800
Upper Guadalupe River Project Area
Guadalupe River Project Area (Downtown San Jose)
Lower Guadalupe River Project Area
Legend
9,100
Flow by Reach in the Guadalupe River Channel (cfs)

Source:

100-year design floodflow is based on U.S. Army Corps of Engineers (1993).

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Figure 3-11. Flows in the Guadalupe River at the Peak of the 100-Year Design Floodflow – Proposed Project

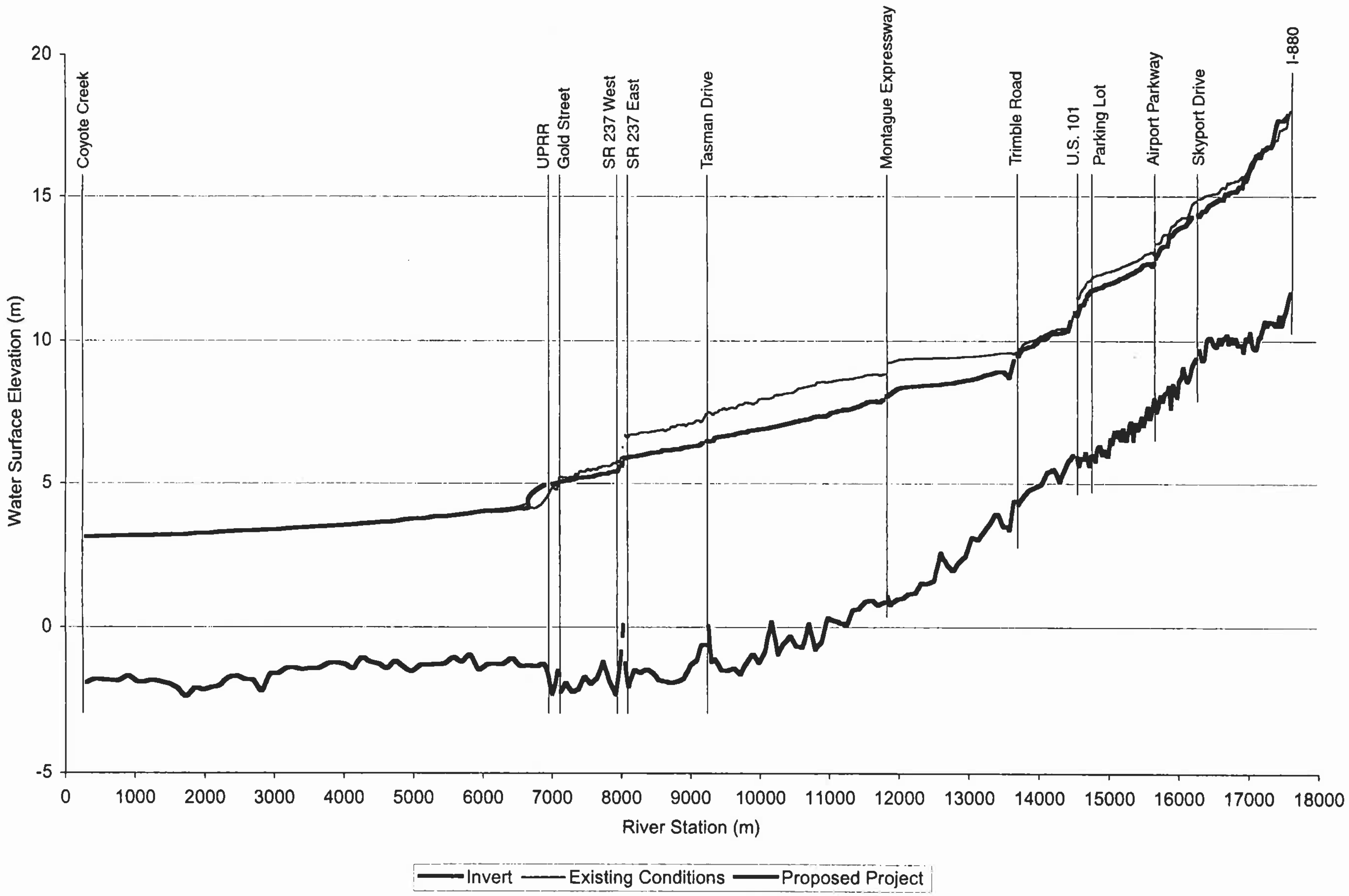

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Figure 3-12. Water Surface Elevations During the Design Flood Event

~~there would be increased flood volumes ranging from 16% to 22% in the salt ponds west of Alviso Slough (A5, A7, A8).~~

Without pumping or implementing other floodwater evacuation methods, it would take months, even years, for the floodwaters to evaporate under the Proposed Project. Assuming a design flood event on January 1, and applying the long-term mean monthly precipitation evaporation rates, it could take 40 ~~43~~ months for the water to evaporate from Cargill Salt Pond A8W. Table 3-6 shows that the Proposed Project would increase the duration of flooding by about 12% to 30% ~~19%~~ in the affected Cargill ponds.

The flooding induced under the Proposed Project downstream of the LGRP in the Cargill Salt Ponds is considered a significant impact, because depth and volume of flooding would increase in Ponds A5, A7, A8D, and A8W. The potential for severe erosion caused by increased depth and volume of floodflow over the marina parking area from the Guadalupe River, and the consequential increased risk of levee failure and flooding in the town of Alviso, is also considered a significant impact.

Preliminary engineering analyses (Northwest Hydraulic Consultants ~~2001~~ 2002) show that implementing the measures described below, collectively called the *Baylands Mitigation Measure*, and shown in figure 3-13 will provide storage and conveyance capacity that will

- reduce the potential uncontrolled flooding of the Cargill Salt Ponds along the west side of Alviso Slough,
- ~~reduce flooding of the salt ponds to the east of Alviso Slough,~~
- prevent flooding over the marina parking area and adjacent levees into the town of Alviso,
- minimize impacts on Alviso Slough because of increased flow,
- reduce the duration of flooding in the Cargill Salt Ponds, and
- reduce depth of flooding in New Chicago Marsh.

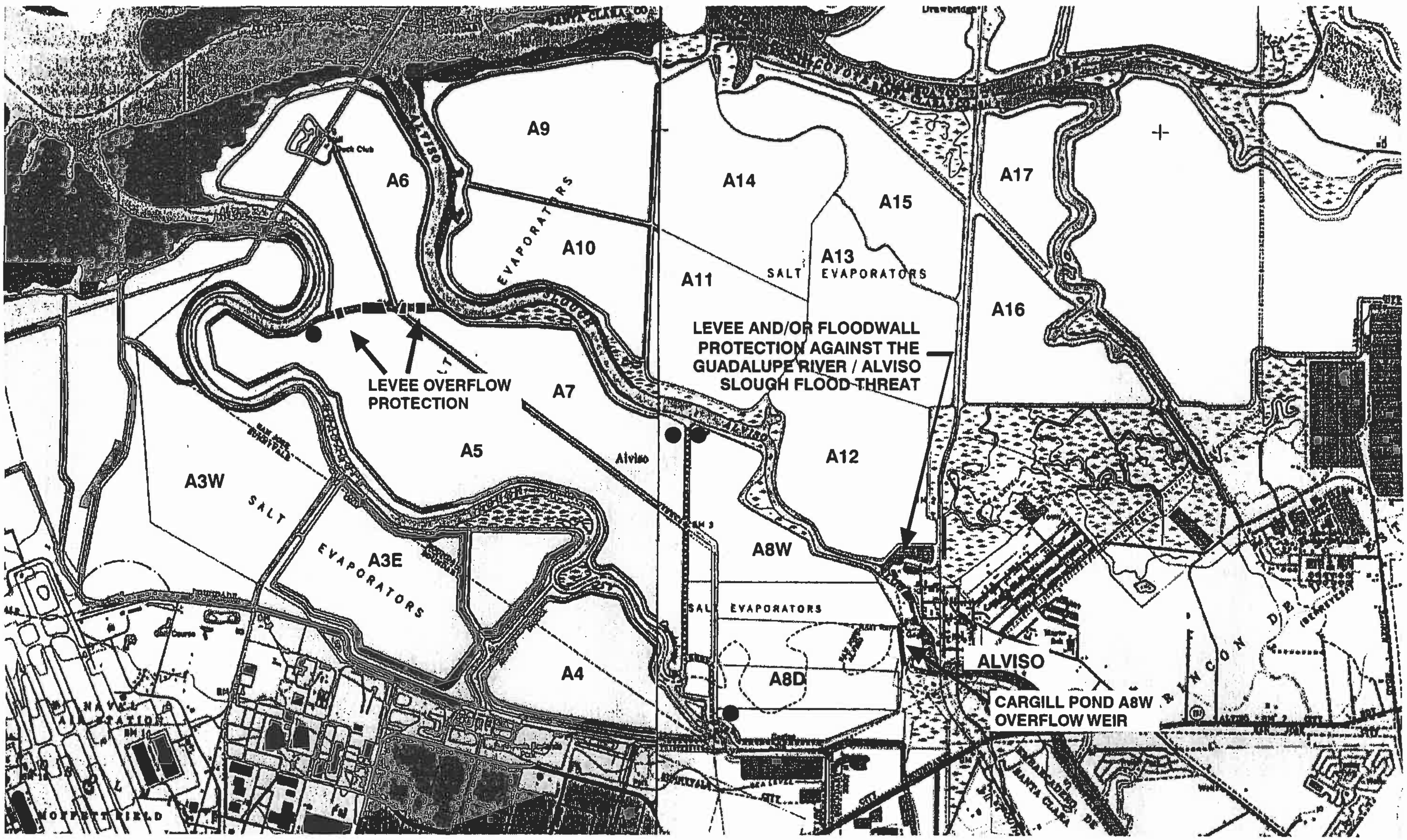
Implementing these measures will reduce the flooding effects of the Proposed Project to a less-than-significant level because flooding impacts induced by the Proposed Project would be reduced in the Cargill Salt Ponds and further reduced in Alviso, New Chicago Marsh, and Rincon de los Esteros.

Table 3-5. Baylands Flood Volumes under Existing Conditions and Proposed Project

Baylands Area	Existing Conditions (af)	Proposed Project (af)	Change (af)	Change (percent)
Cargill Pond A3E	31 ~~45~~	49 ~~45~~	18 ~~0~~	58 ~~0~~
Cargill Pond A5	3,729 ~~3,635~~	4,519 ~~4,387~~	790 ~~752~~	21 ~~20~~
USFWS Refuge (A6)	0	0	0	0
Cargill Pond A7	1,556 ~~1,507~~	1,884 ~~1,845~~	328 ~~338~~	21 ~~22~~
Cargill Pond A8D	1,069 ~~1~~	1,299 ~~1,268~~	230 ~~217~~	22 ~~21~~
Cargill Pond A8W	3,430 ~~3,360~~	3,957 ~~3,899~~	527 ~~539~~	15 ~~16~~
Cargill Pond A12	0 ~~653~~	16 ~~498~~	16 ~~(155)~~	0 ~~(24)~~
Cargill Pond A13	70 ~~676~~	70 ~~513~~	0 ~~(163)~~	0 ~~(24)~~
Cargill Pond A15	129 ~~380~~	129 ~~355~~	0 ~~(25)~~	0 ~~(7)~~
Cargill Pond A17	607 ~~440~~	607 ~~440~~	0	0
Total Flood Volume	10,621 ~~10,697~~	12,519 ~~13,250~~	1,909 ~~1,503~~	18

Source: Northwest Hydraulic Consultants ~~2001~~ 2002.

Cargill's Salt Ponds are nonengineered structures, constructed of locally dredged materials. As a result, there is some risk that these levees could fail under both existing and project conditions. However, compared to existing conditions that include substantial flooding in Cargill's ponds during a design event and increasing significantly greater flow in Alviso Slough, flood hazards related to levee stability issues are expected to be less severe under the Proposed Project because continuing the existing pattern of floodflows into the Cargill ponds on the west side of Alviso Slough would lessen the flood threat for the community of Alviso. Continuing floodflows to Ponds A8W, A8D, A5, A7, and A6 via the Alviso Weir (Mitigation Measure HH-2) would allow adequate storage of flood volumes under modeled conditions and not increasing flow in Alviso Slough. The potential for catastrophic flooding in populated areas (community of Alviso) because


A9
A6
A10
A14
A15
A13
A11
A17
A16
SALT EVAPORATORS
EVAPORATORS
LEVEE AND/OR FLOODWALL PROTECTION AGAINST THE GUADALUPE RIVER / ALVISO SLOUGH FLOOD THREAT
LEVEE OVERFLOW PROTECTION
A7
A5
Alviso
A12
A3W
SALT
A3E
EVAPORATORS
A8W
SALT EVAPORATORS
A4
A8D
ALVISO
CARGILL POND A8W OVERFLOW WEIR
ALVISO SLOUGH
RINCON DE

LEGEND

A7 CARGILL EVAPORATION POND NUMBER AND APPROXIMATE STORAGE CELL BOUNDARY

● TEMPORARY PUMP LOCATION

Note: The size and locations of these baylands flood mitigation components are subject to change during feasibility planning and/or final design.

Source:
Northwest Hydraulic Consultants, Inc. 2001

Figure 3-13. Conceptual Baylands Improvements, UPRR to the Bay

of a levee failure under existing conditions is greater than under Proposed Project with an engineered weir in the Pond A8W levee. Increased significant flow in Alviso Slough could increase the potential for failure of the east Alviso Slough levee, which would likely result in flooding in the Cargill ponds east of Alviso Slough and potential catastrophic "back door" flooding in the community of Alviso through the Alviso Marina. Under the Proposed Project, potential failure of the west Alviso Slough levee (adjacent to Cargill Ponds A8W, A5 and A7) would be less hazardous for the community of Alviso than failure of the east Alviso Slough levee. Both the east and west Alviso Slough levees would have to fail for floodwaters stored in ponds west of Alviso Slough to reach the community of Alviso. Under the Proposed Project, the risk of catastrophic flooding (related to slough levee failure) is also reduced by raising the west-perimeter levee around the community of Alviso (Mitigation Measure HH-1) and by pumping Cargill's ponds to reduce the amount of time that the Alviso Slough west levee has flood waters pond on its sides. This potential impact would be less than significant because flood hazards under this condition would be less than those expected under existing conditions.

Mitigation Measure HH-1: Raise West-Perimeter Levee Around Alviso

To prevent Guadalupe River floodwaters from flowing around the levee system to Alviso, the District will raise the existing levee on the east bank of Alviso Slough from approximately the UPRR trestle downstream to the northeast corner of the County marina. This will prevent overtopping of the marina's parking area and adjacent levees.

Mitigation Measure HH-2: Construct Alviso Slough Overflow Weir and Harden Pond A6 Levee

The District will construct an overflow weir along Alviso Slough. This weir will be approximately ~~152~~ 305 m (~~500~~ 1,000 feet) long and will be located immediately across from Alviso in the same location as the existing natural low spot in the Cargill levee. The levee will be designed to limit peak discharges to Alviso Slough at the existing levels. Under existing conditions, flows of 193 cms (6,800 cfs) or greater result in spillage over this low-point along the levee; this will not change under the Proposed Project. Construction of the overflow weir will provide a benefit because it will prevent downcutting and potential failure of the levee at this low point. The construction footprint of this structure, including entrance and exit aprons, is approximately 50 ~~15.2~~ by 350 ~~152.4~~ m (165 ~~50~~ by ~~500~~ 1,148 feet).

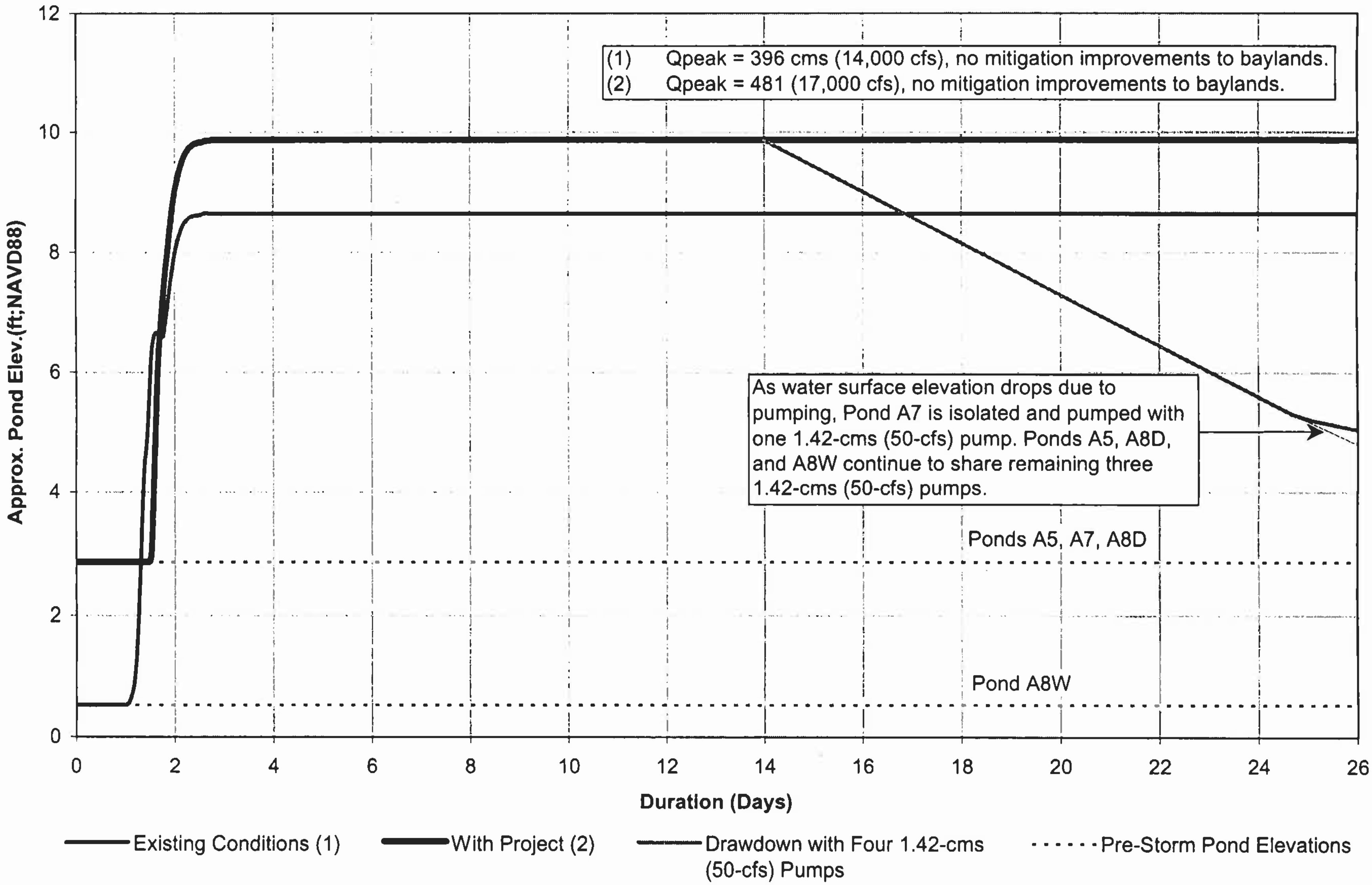
To prevent downcutting of the levee separating Ponds A5/A7 and A6 by cumulative floodflows (see discussion below under *Baylands Mitigation Measure)*, concrete cellular mattresses will be used to protect overflow areas along this levee.

Table 3-6. Estimated Number of Months Required for Floodwater to Evaporate

Baylands Area	Existing Conditions	Proposed Project	Change (percent)
Cargill Pond A3E	3 ~~2~~	3 ~~2~~	0
Cargill Pond A5	21 ~~26~~	31	19
USFWS Refuge (A6)	0	0	0
Cargill Pond A7	21 ~~26~~	30 ~~31~~	19
Cargill Pond A8D	21 ~~26~~	29 ~~31~~	20 ~~19~~
Cargill Pond A8W	31 ~~36~~	40 ~~43~~	30 ~~19~~
Cargill Pond A12	3 ~~6~~	3 ~~5~~	0 ~~-16~~
Cargill Pond A13	4 ~~7~~	4 ~~6~~	0 ~~-14~~
Cargill Pond A15	5	5	0
Cargill Pond A17	16	16	0

Mitigation Measure HH-3: Pump Cargill Salt Ponds

The District will pump floodwaters from the Cargill Salt Ponds to reduce the depth and duration of floodflows in Ponds A5, A6 (USFWS Refuge), A7, A8D, and A8W to a lower level than would be expected in these ponds under existing conditions (figure 3-14). Temporary 1.42-cms (50-cfs) pumps will be operated on each pond ~~for up to~~ from 24 to 54 ~~12~~ days once pumps are operational at pump sites following a flood event ~~(estimated to be approximately 2 weeks for mobilization)~~. Pumping will not begin earlier than 2 weeks following the end of the design storm event to allow for some sediment settling. The temporary pumps in ~~this~~ these ponds would be run continuously until floodwaters are evacuated completely (approximately 45 days for A5, 24 days for A6, 48 days for A7, 44 days for A8D, and 54 days for A8W after the end of the storm). In addition, a floating intake valve will be placed on the temporary pumps so that water near the surface of the pond is pumped out. This mitigation measure is more beneficial than a mitigation



(1) Qpeak = 396 cms (14,000 cfs), no mitigation improvements to baylands.
(2) Qpeak = 481 (17,000 cfs), no mitigation improvements to baylands.

As water surface elevation drops due to pumping, Pond A7 is isolated and pumped with one 1.42-cms (50-cfs) pump. Ponds A5, A8D, and A8W continue to share remaining three 1.42-cms (50-cfs) pumps.

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Figure 3-14. Effects of Operation of Temporary Pumps on Depth of Flooding in Cargill Salt Ponds

concept involving construction of outlet culverts on Ponds A5, A6, A7, A8D, and A8W. It will also provide more control over the amount of floodwaters evacuated from Cargill's ponds with temporary pumping versus use of outlet culverts. Project impacts on marsh habitat would be reduced with temporary pumps compared to impacts on habitat that would result from outlet culverts.

Mitigation Measure HH-4: Manage Vegetation in Alviso Slough from UPRR Downstream to Overflow Weir

The District will aggressively manage vegetation on the east bank of Alviso Slough extending approximately 225 m (738 feet) from the UPRR bridge opposite the location of the overflow weir. From an access road constructed along the toe of the levee, vegetation will be removed using a shallow dredging technique that removes approximately 1 m (3.3 feet) of sediments. From the limits of the shallow dredging area to 6 m (19.7 feet) from the active channel, vegetation will be controlled with the use of herbicides certified for wetland use.

Alternative 3: Channel Bank Modification

Impact: Reduction in the Potential for Flooding in San Jose and Santa Clara

The HEC-RAS modeling results show that if the Channel Bank Modification Alternative were implemented, the LGRP would be able to convey the design floodflow of 481 cms (17,000 cfs) with the required freeboard between I-880 and the UPRR bridge in a manner similar to that described for the Proposed Project. Implementing this alternative would increase the conveyance capacity of the lower Guadalupe River from 396 cms (14,000 cfs) to 481 cms (17,000 cfs), allowing operation of the upstream flood protection projects in downtown San Jose and along the upper Guadalupe River. Figure 3-15 depicts the design floodflow and channel conveyance capacities that would exist under this alternative. The increased conveyance capacity would reduce the potential for upstream flooding. Figure 3-16 shows reduction in flood stage as a result of the Channel Bank

Modification Alternative. This impact is considered beneficial. No mitigation is required.

Impact: Potential for Downstream Flooding Induced by the LGRP

As under the Proposed Project, the Channel Bank Modification Alternative would allow the LGRP to convey the design floodflow of 481 cms (17,000 cfs) through the LGRP reaches and would reduce the potential for flooding in downtown San Jose and along the upper Guadalupe River. However, as with the Proposed Project, the ability to convey 481 cms (17,000 cfs) under the Channel Bank Modification Alternative could result in increased depth and duration of flooding downstream in Cargill Salt Ponds A5, A7, A8D, and A8W.

The potential for induced flooding downstream under the Channel Bank Modification Alternative is considered a significant impact. Implementation of the following mitigation measures would reduce this impact to a less-than-significant level.

Mitigation Measure HH-1: Construct West-Perimeter Levee Around Alviso

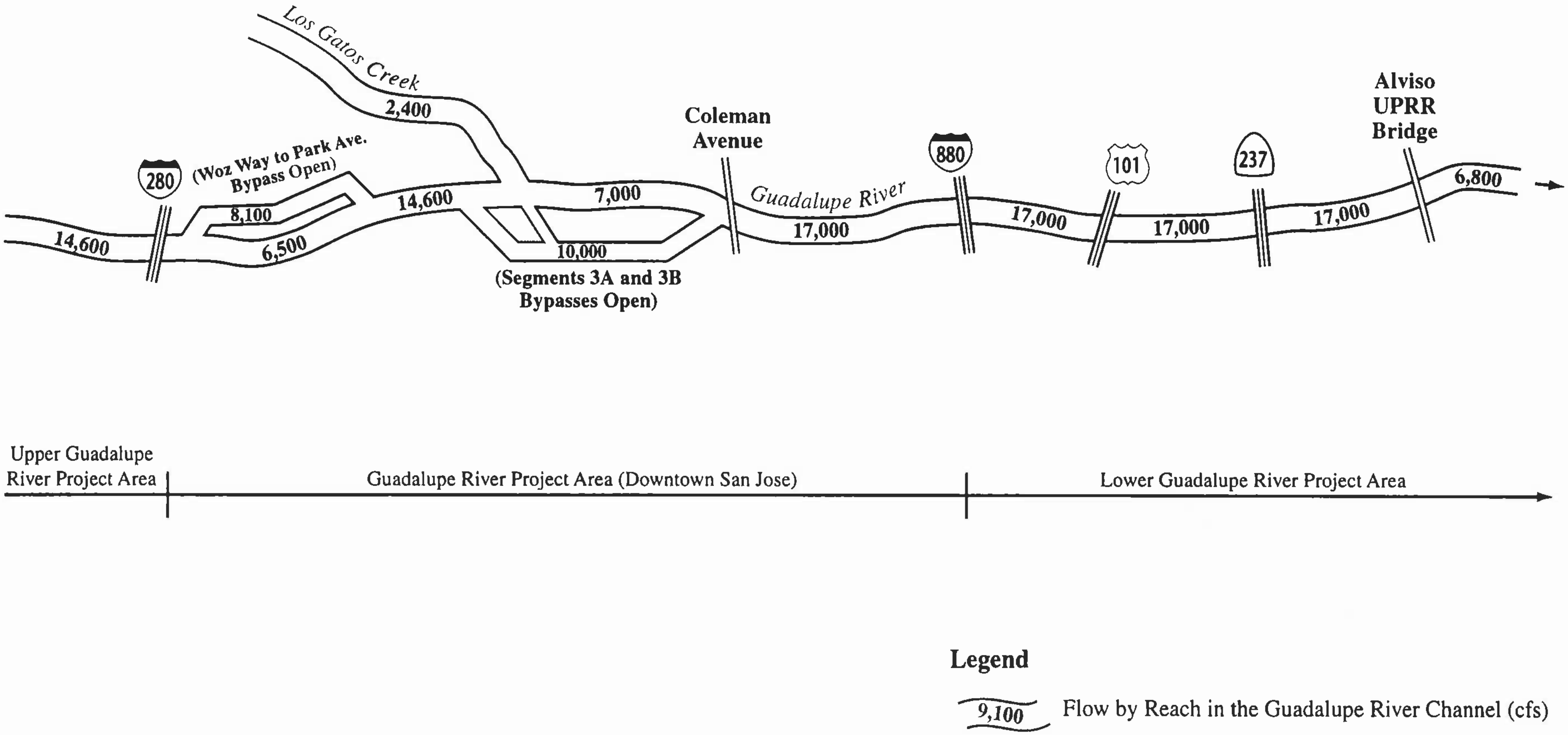
This mitigation measure is described in detail under "Alternative 2: Floodwalls/Levee Raise (Proposed Project)" above.

Mitigation Measure HH-2: Construct Alviso Slough Overflow Weir and Harden Pond A6 Levee

This mitigation measure is described in detail under "Alternative 2: Floodwalls/Levee Raise (Proposed Project)" above.

Mitigation Measure HH-3: Pump Cargill Salt Ponds

This mitigation measure is described in detail under "Alternative 2: Floodwalls/Levee Raise (Proposed Project)" above.


Los Gatos Creek
2,400
280
(Woz Way to Park Ave. Bypass Open)
8,100
6,500
14,600
14,600
7,000
10,000
(Segments 3A and 3B Bypasses Open)
Coleman Avenue
Guadalupe River
17,000
880
17,000
101
17,000
237
17,000
Alviso UPRR Bridge
6,800
Upper Guadalupe River Project Area
Guadalupe River Project Area (Downtown San Jose)
Lower Guadalupe River Project Area
Legend
9,100
Flow by Reach in the Guadalupe River Channel (cfs)

Source:

100-year design floodflow is based on U.S. Army Corps of Engineers (1993).

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Figure 3-15. Flows in the Guadalupe River at the Peak of the 100-Year Design Floodflow – Channel Bank Modification Alternative

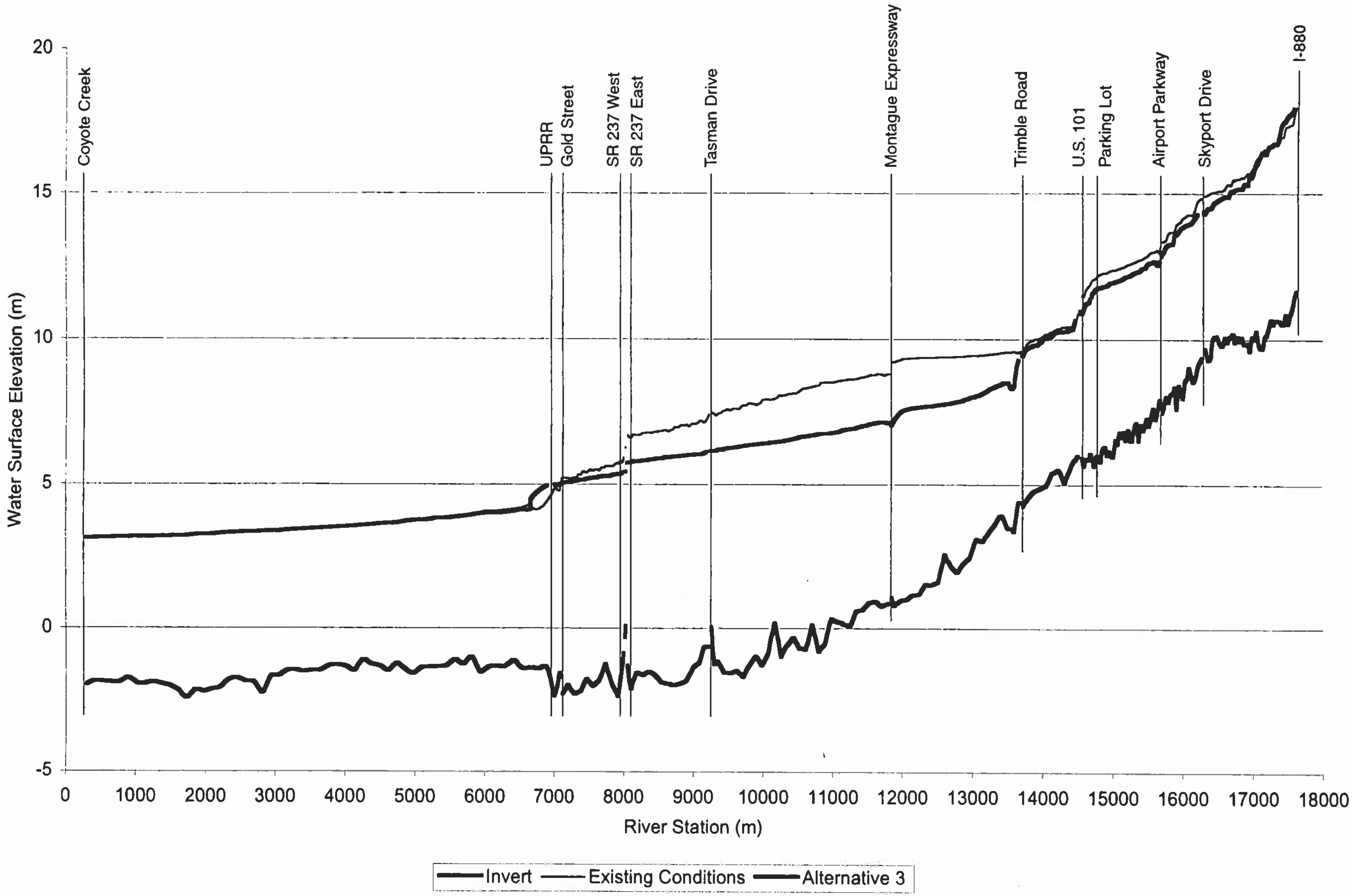


Figure 3-16. Water Surface Elevations During the Design Flood Event

Mitigation Measure HH-4: Manage Vegetation in Alviso Slough from UPRR Downstream to Overflow Weir

This mitigation measure is described in detail under "Alternative 2: Floodwalls/Levee Raise (Proposed Project)" above.

Alternative 4: Channel Bypass

Alternative 4 would provide the same level of flood protection to San Jose and Santa Clara as the Proposed Project. Although the increase in channel storage capacity and changes in flood routing may somewhat attenuate the flood peak, the resultant flows would still exceed the existing capacity of Alviso Slough and increase the downstream flood threat, as described previously for the Proposed Project. The town of Alviso would be exposed to greater flood threat from increased overtopping of the marina levee, and the Cargill Salt Ponds would be exposed to greater flooding by overtopping the low area in the Pond A8W levee on the west bank of Alviso Slough. As described for the Proposed Project, the Baylands Mitigation Measure would be required to reduce these flood threats to less-than-significant levels.

Baylands Mitigation Measure

Implementation of the Baylands Mitigation Measure will induce flooding in Pond A6. The latest UNET model runs, updated with recently surveyed levee elevations, indicate that the increased efficiency of the overflow weir (Mitigation Measure HH-2) compared to the existing levee low spot causes more water to flow into the salt ponds than under project conditions. This increased efficiency would allow approximately 866,000 cubic meters (700 acre feet) of water to spill into Pond A6 from Ponds A5 and A7. The flood waters would be approximately 0.6 meters (2 feet) deep.

Water from A5 and A7 would spill over approximately 450 meters (1,500 feet) of an unprotected levee into A6. Because it is anticipated that Pond A6 will be restored to tidal marsh in the near future, these overflow areas must be protected to prevent levee downcutting and subjecting Ponds A5 and A7 to tidal flooding. Mitigation Measure HH-2 has been modified to include hardening of these overflow areas. Concrete cellular mattresses will be used to protect these overflow areas. CCMs would be installed with a crane onto the levee crest down the A6 side of the levee and into the borrow area at the toe of the levee to prevent erosion and provide energy dissipation. Although other revetment materials (rip-rap) could be used, CCMs are linked together with cable and could be removed to facilitate additional wetland restoration. Also, because CMMs have void spaces, vegetation can grow through the spaces, minimizing the impacts to vegetative communities and the wildlife that they support.

~~No additional hydrologic or hydraulic impacts were identified as a result of implementing the Baylands Mitigation Measure.~~

Preliminary engineering analyses (Northwest Hydraulic Consultants ~~2001~~ 2002) show that implementing the measures described above and shown in figure 3-13 will provide storage and conveyance capacity that will

- reduce the potential uncontrolled flooding of the Cargill Salt Ponds along the west side of Alviso Slough,
- ~~reduce flooding of the salt ponds to the east of Alviso Slough,~~
- prevent flooding over the marina parking area and adjacent levees into the town of Alviso,
- minimize impacts on Alviso Slough because of increased flow,
- reduce the duration of flooding in the Cargill Salt Ponds, and
- reduce depth of flooding in New Chicago Marsh.

Flooding in the baylands study area with the Proposed Project plus the Baylands Mitigation Measure will change flood distribution from Alviso, and New Chicago Marsh to Cargill Salt Ponds A5, A6, A7, A8D, and A8W. Implementing this measure will reduce the flooding effects of the Proposed Project to a less-than-significant level, but may have adverse effects on other resource areas, such as geomorphology and geology, water quality, vegetation, wildlife, land use and planning, and historic and archaeological resources. To address the effects of implementing the Baylands Mitigation Measure, each of the resource sections includes a discussion of impacts and, where appropriate, suggests the need for additional mitigation measures that would be incorporated into the Baylands Mitigation Measure to ensure that no additional significant impacts would result from its implementation.

Fluvial Geomorphology and Geologic Hazards

Fluvial Geomorphology

Sediment Load

Fluvial geomorphology processes are present basinwide; therefore, sediment yield and sediment load have been considered for all areas of the basin. However, ongoing channel erosion and deposition and existing river morphology are discussed only for the lower Guadalupe River in this section. The overall trend for sediment deposition or erosion and general assessment of river morphology are presented for specific reaches.

Sediment load is the total sediment derived from the land surface and being moved by flowing water. Sediment load plays an important role in channel erosion and deposition and, ultimately, river morphology. Sediment load is divided into 2 distinct components: bed load and suspended load (wash load).

Bed load is composed of materials coarser than fine sands (i.e., sediments greater than 0.0625 millimeter [mm] [0.002 inch] in diameter). Bed-load deposition can substantially affect the flood-conveyance capacity of a channel. Because the coarse sediments that compose bed load move downriver in pulses in response to the peak and duration of individual floodflows, bed-load sediments can accumulate in some reaches of a river during small floods and be scoured away in large floods. Conversely, these sediments can also accumulate during large floods and be scoured away during small floods. The bed load can accumulate for years before a floodflow has enough energy to move the sediments. Because such a floodflow might be substantially larger than the design capacity of the channel, these sediments must typically be removed to prevent flooding during smaller floodflows. Wash load comprises silts, clays, and organic materials (i.e., sediments less than 0.0625 mm [0.002 inch] in diameter).

Because of the relatively small size of the effective drainage area compared to the total drainage area, the sediment load delivered to the LGRP is low (U.S. Army Corps of Engineers 1991). Although the total drainage area for the Guadalupe River is approximately 414 km^2 (160 square miles), only 130 km^2 (50 square miles) of effective drainage area contribute to the sediment load in the Guadalupe River (U.S. Army Corps of Engineers 1991).

Approximately 44% of the drainage area is controlled by reservoirs located in the foothills of the Diablo Range and the Santa Cruz Mountains. These reservoirs capture the sediment load from the upstream tributaries of the Guadalupe River. In addition, much of the Santa Clara Valley floor is densely urbanized, which reduces the area of potential sediment production.

USGS analyzed suspended sediment data from a small number of samples collected in the late 1950s and early 1960s from the Guadalupe River at San Jose gage near St. John Street (table 3-7). The samples were analyzed for wash load and bed load. The data indicate that the transport rates for suspended sediments depend on flow and that the proportion of silts and clays to sands varies, although the silt and clay loads always constitute the largest proportion of the total suspended sediment.

Table 3-7. Suspended Sediment Load in the Guadalupe River Measured at the U.S. Geological Survey's Guadalupe River at San Jose Gage*

		Wash Load (Less than 0.0625 mm)		Total Suspended Sand	
Flow (cfs)	Total Suspended Sediment (tons/day)	Tons/Day	Percent	Tons/Day	Percent
13	70	60	86	10	14
77	761	647	85	114	15
84	130	100	77	30	23
88	113	84	74	29	26
97	149	140	94	9	6
272	1,620	1,490	92	130	8
344	947	551	61	396	39
465	1,260	1,084	86	176	14
481	1,870	1,571	84	299	16
548	1,370	942	68	428	32
587	1,500	1,080	72	420	18
620	4,150	2,531	61	1,618	39
675	10,900	7,521	69	3,379	31
1,450	16,200	11,016	68	5,184	32

---

* The suspended sediment transport rates depend on flow. Suspended sand is only a small proportion of the total suspended sediment.

Source: Hydrosphere Data Products 1999.

Sediment delivery rating curves were developed based on the measured sediment data in table 3-7, measured changes in channel form, and particle-size distribution analyses (Northwest Hydraulic Consultants 2000). Figure 3-17 shows the calculated rating curves and data measured by USGS.

The annual delivery of wash-load and bed-load sediments to the lower Guadalupe River can vary considerably, depending on watershed conditions and the magnitude and frequency of single flood events. It is important to estimate sediment production and delivery from possible single flood events; it is also important to estimate a long-term average annual rate. Single flood events range from small flows with a 50% chance of occurring (2-year floodflow) to large flows with a 1% chance of occurring (100-year floodflow). One or more substantial single flood events during the life of the LGRP could contribute substantial quantities of sediment to the project area, which would have a substantial effect on operation and maintenance of the LRGP. Table 3-8 shows the amount of bed-load and wash-load sediment delivered to the project area during single flood events with various flows; the table also shows annual average loads.

During the design floodflow, the estimated sediment delivery to the project area is 401,906 metric tons (443,026 tons). Bed load composes approximately 66,800 metric tons (73,634 tons) of this load. It is estimated that only 3,351 metric tons (3,694 tons), or 5%, of this bed load is discharged to Alviso Slough.

Channel Erosion and Deposition

Channel erosion and deposition are natural processes needed to maintain a healthy riverine environment; however, too much erosion can undermine infrastructure, reduce bank stability, and erode spawning gravels. Too much sedimentation can reduce the flood protection values of the channel, fill pools, smother invertebrates, and fill pore spaces in spawning gravels. Channel erosion and deposition can affect the stability of a river's bed and banks; the effect on stability can in turn affect SRA cover vegetation, instream cover, substrate composition, and other components of habitat for aquatic species. Excessive channel erosion and deposition usually occur in specific locations where uniform transport of sediment load is disturbed by changes in the cross-sectional area or slope of the channel.

Changes in channel erosion or deposition are reflected in the amount of sediment transported from 1 segment of a river to the next. Sediment is transported in 2 principal forms: wash load and bed load. Wash-load sediment is eroded material in the form of clays, silts, and fine sands that becomes suspended in the water column, does not settle out, and is normally transported to the mouth of the river. Bed-load sediment is larger eroded material that is transported only when there is sufficient energy. Consequently, depending on the magnitude and duration of a particular flow event, bed-load sediment can be eroded from 1 channel-bed location, transported a certain distance (potentially miles), and deposited at a location downstream. Table 3-9 presents the changes in lower Guadalupe River bed elevation that are estimated to take place because of substantial flood events.

River Morphology

Before human influence, floodwaters in the Guadalupe River system were allowed to overflow the streambanks and spread onto a broad natural floodplain, dropping much of their sediment load onto the floodplain in the process. The lower Guadalupe River is currently a managed floodway. The natural river channel in the project area has been straightened and leveed, giving it a relatively simple and uniform cross-sectional configuration (figure 3-18). High flows are confined to a relatively narrow, leveed channel system that allows little opportunity for floodwaters to spread onto the floodplain.

The morphology (i.e., channel form and processes) of the lower Guadalupe River can be divided into 2 distinct reaches: tidal and nontidal. The tidal reach (reaches D–G of the LGRP) extends from San Francisco Bay to Montague Expressway, the upstream tidal limit. The nontidal reach (reaches A–C of the LGRP) consists of a steeper channel slope with higher energy conditions, characterized by gravel-size bed material in the low-flow channel, gravel bars, and occasional steep, eroded banks. A primary difference between the tidal and nontidal reaches results from a change in elevation and slope at Montague Expressway. As the lower Guadalupe River enters the tidal reach, where its elevation is within the zone of influence of San Francisco Bay tides, the river's slope abruptly decreases, reducing sediment transport capacity and thereby resulting in substantial sand and gravel deposition near Trimble Road, approximately 4 miles downstream of I-880. The channel slope of the tidal reach continues to decrease with distance downstream.

The channel form includes riffles, runs, and pools. Riffles are characterized by shallow, fast-moving water with surface turbulence. Runs are similar to riffles, but they are usually deeper and lack surface turbulence. Pools are characterized by relatively deep, slow-moving water, and generally retain water when streamflow approaches zero. The upper reaches comprise pools separated by short runs and riffles.

Table 3-8. Guadalupe River HEC6t Run (Existing Conditions)

	Sediment Delivered to Project Area (Tons)													
	2-Year Flood		5-Year Flood		10-Year Flood		25-Year Flood		50-Year Flood		Design Flood		Average Annual	
Bridge	Sand	Silt & Clay	Sand	Silt & Clay	Sand	Silt & Clay	Sand	Silt & Clay	Sand	Silt & Clay	Sand	Silt & Clay	Sand	Silt & Clay
After 3 Days (Peak Flow)														
UPRR	6	7,380	17	24,077	79	47,988	630	92,773	1,766	144,780	2,909	167,121	106.845	19,257.9
SR 237	7	7,380	20	24,077	143	47,988	950	92,773	2,456	144,780	3,851	167,121	150.145	19,257.9
Tasman	6	7,380	32	24,077	257	47,988	1,448	92,773	3,467	144,780	5,191	167,121	216.55	19,257.9
Montague	42	7,380	262	24.077	1.136	47,988	5,247	92,773	11,348	144,780	19,474	167,121	828.09	19,257.9
Trimble	632	7,362	4,054	24,080	9,441	47,985	19,703	92,770	32,912	144,775	47,633	167,113	3.751.98	19,252.5
U.S. 101	1,339	7,377	5,317	24,080	10,524	47,981	23,014	92,763	38,997	144,765	58,243	167,097	4,686.18	19,256
I-880	2,181	7.351	5,737	24,053	10.382	47,956	17,545	92,713	26,510	144,702	34,721	167.003	4,252.53	19.236.5
After 8 Days (End of Hydrograph)														
UPRR	9	13,270	38	45,179	113	90,136	684	176,394	2,074	283,247	3.694	369,517	133.22	37,074.9
SR 237	16	13,270	56	45,179	180	90,136	1,040	176,394	2,973	283,247	5,077	369,517	192.75	37,074.9
Tasman	39	13,270	115	45,178	300	90,136	1,615	176,394	4,344	283,247	7,109	369,517	295.095	37,074.7
Montague	117	13,268	655	45,178	1,609	90,136	6,314	176,394	15,077	283,247	26,114	369,517	1,165.25	37.074.1
Trimble	1,056	13,268	5,927	45,190	13,222	90,132	28,992	176,392	50,672	283,242	76,750	369,510	5,630.97	37,075.9
U.S. 101	2,162	13,268	8,526	45.188	15,815	90,128	33,484	176,384	57,093	283,232	86,527	369,490	7,112.66	37,074.4
I-880	3,473	13,228	9,794	45.154	17,954	90,102	34,233	176,329	52,012	283,164	73,634	369,392	7,691.03	37,048.9

Table 3-9. Guadalupe River HEC6t Run (Existing Conditions)—Difference in Bed Elevation after Various Floods

		Elevation Difference in Meters (Feet) After Flood Events					
		25-Year Flood		50-Year Flood		Design Flood	
Bridge	Bed Elevation Before Flood Event	Bed Elevation	Difference	Bed Elevation	Difference	Bed Elevation	Difference
UPRR	–2.28 (–7.48)	–2.28 (–7.48)	0 (0)	–2.28 (–7.48)	0 (0)	–2.28 (–7.48)	0 (0)
SR 237	0.06 (0.2)	0.06 (0.2)	0 (0)	0.06 (0.2)	0 (0)	0.06 (0.2)	0 (0)
Tasman	–0.62 (–2.03)	–0.62 (–2.03)	0 (0)	–0.62 (–2.03)	0 (0)	–0.62 (–2.03)	0 (0)
Montague	0.8 (2.62)	0.84 (2.76)	0.04 (0.14)	0.84 (2.76)	0.04 (0.14)	0.84 (2.76)	0.04 (0.14)
Trimble	4.37 (14.34)	4.17 (13.69)	–0.2 (–0.65)	4.07 (13.35)	–0.3 (–0.99)	4.00 (13.11)	–0.37 (–1.23)
U.S. 101	5.98 (19.61)	5.52 (18.1)	–0.46 (–1.51)	5.27 (17.29)	–0.71 (–2.32)	5.01 (16.43)	–0.97 (–3.18)
I-880	11.42 (37.47)	11.52 (37.79)	0.1 (0.32)	11.42 (37.46)	0 (–0.01)	11.42 (37.47)	0 (0)

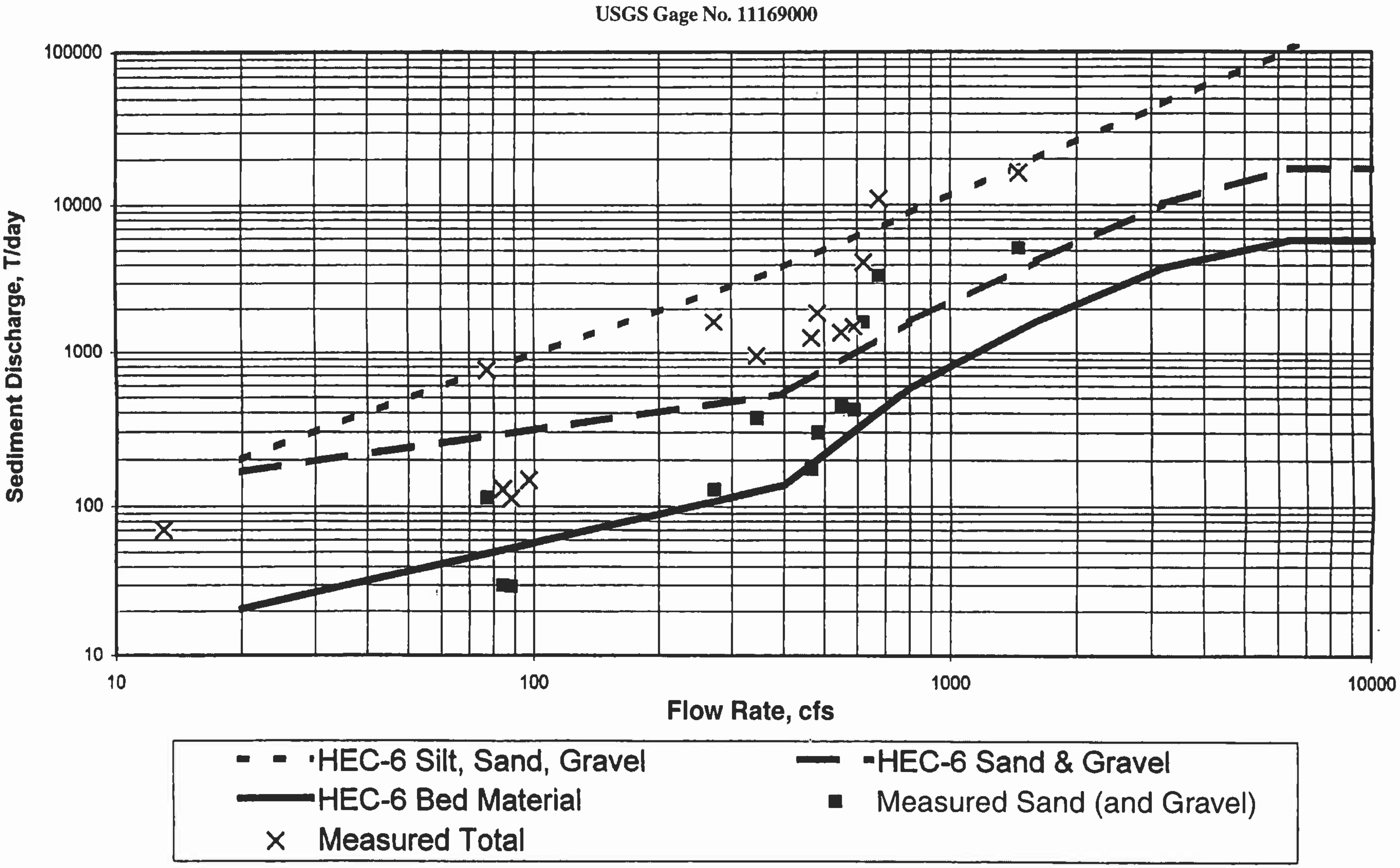
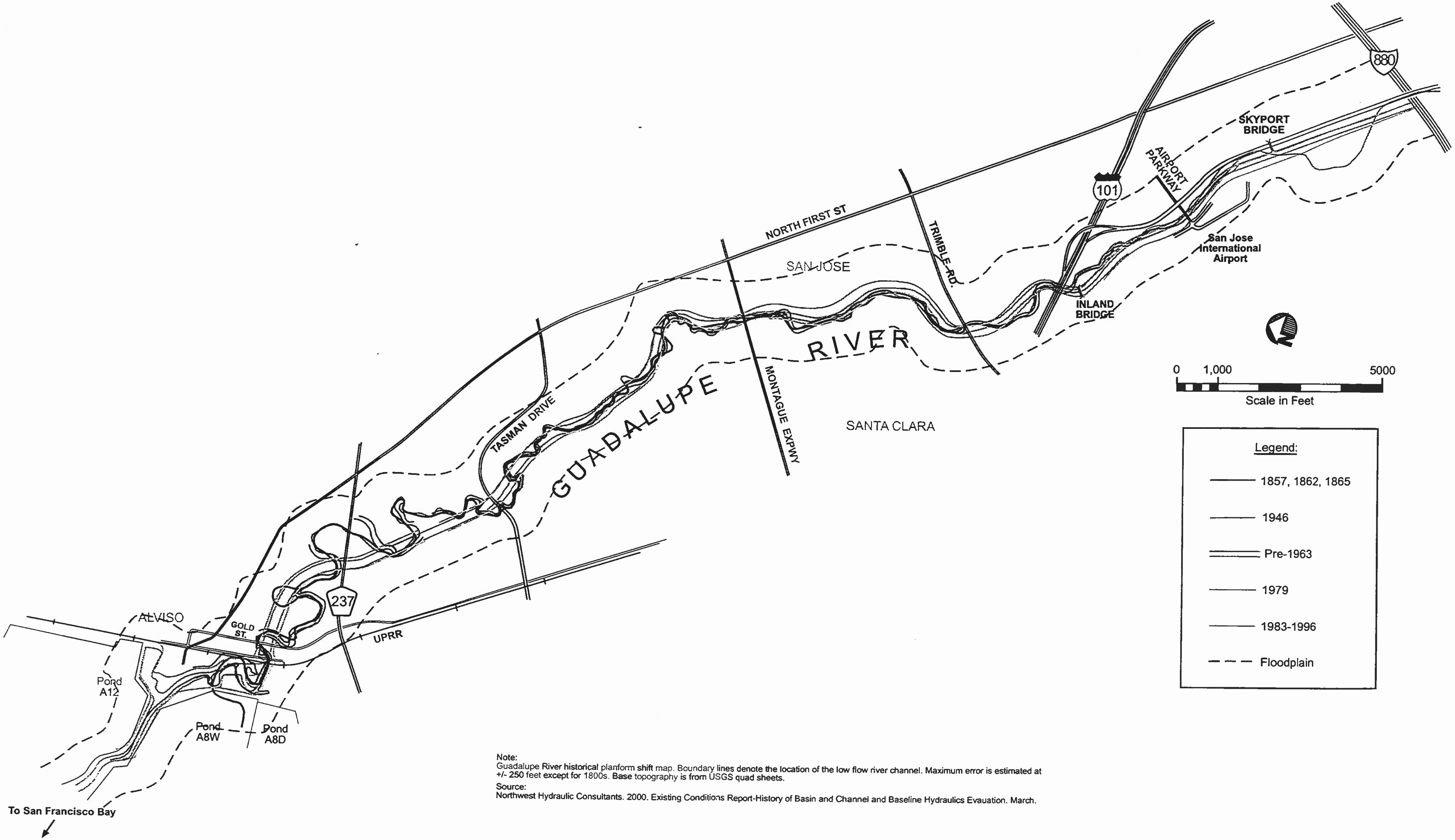


Figure 3-17. Sediment Discharge Rating Curves at the Guadalupe River and I-880



Note:
Guadalupe River historical planform shift map. Boundary lines denote the location of the low flow river channel. Maximum error is estimated at +/- 250 feet except for 1800s. Base topography is from USGS quad sheets.

Source:
Northwest Hydraulic Consultants. 2000. Existing Conditions Report-History of Basin and Channel and Baseline Hydraulics Evauation. March.

Source:
CH2M Hill 2000a.

Figure 3-18
Guadalupe River
Historical Planform Shift Map

Channel-maintenance flows and gravel-flushing flows are necessary to maintain channel form and gravel quality (Milhous and Bovee 1977, Rosgen et al. 1986). Changes in sediment-transport rates or flow can cause changes in channel form and loss of spawning and cover habitat for fish (Milhous and Bovee 1977). Increases in the width-to-depth ratio of a stream channel can degrade fish habitat (e.g., spawning habitat) and create passage problems for migrating species (e.g., steelhead and chinook salmon). Substantial reductions in peak flow rates can also cause sedimentation problems because the size of bed-load material that can be transported through the system is reduced as the flow is reduced. Deposition of fine sediments, such as sand-, silt-, and clay-size particles, can adversely affect spawning, egg survival, fry emergence, and food production by filling in the pore spaces in cobble and gravel beds.

Channel-maintenance flow is defined as the flow that just fills a nonincised channel to flood stage. Maintenance flows determine channel form and are responsible for transporting the largest proportion of the bed load over the long term (Rosgen et al. 1986). The 1.5-year recurrence-interval flow is considered the channel-maintenance flow for this analysis (Dunne and Leopold 1978, Rosgen et al. 1986). Based on the most recent hydrologic data from USGS's Guadalupe River at San Jose gage, the 1.5-year recurrence-interval flow in the Guadalupe River is estimated to be approximately 1,200 cfs. This flow was calculated from the historical annual-maximum flood series and reflects the effects of urbanization and reservoir operation on the river's hydrologic conditions (U.S. Army Corps of Engineers 2000).

Geologic Hazards

Subsidence

Land subsidence has historically occurred in the Santa Clara Valley as a result of groundwater overdraft. It is estimated that the ground level in the valley subsided by as many as 2.4 m (8 feet) or more between 1934 and 1967 (figure 3-19) (Santa Clara Valley Water District 1999a). Structures that rely on hydraulic gravity flow, such as sewers and storm drains, were affected.

Natural streams were also affected. Local changes in channel-bed elevation have led to accelerated erosion and channel downcutting. Land subsidence has caused the southern shoreline of San Francisco Bay to drop several feet below sea level; as a result, levees were constructed to prevent flooding of the baylands (Santa Clara Valley Water District 1999a). Land subsidence has also allowed incursion of tidal waters from the bay as far upstream as Trimble Road, which threatens the shallow aquifer with saltwater intrusion (Santa Clara Valley Water District 1999a). Subsidence has been largely arrested by importing surface water to reduce groundwater overdraft.

Seismicity

Because the San Francisco Bay region is one of the most seismically active regions in North America, the potential for seismic activity to cause channel changes is high (Northwest Hydraulic Consultants 2000). Earthquakes can cause substantial lateral or vertical land surface adjustments. Strong groundshaking can cause liquefaction of fine-grained tidal deposits or areas of loose, unconsolidated fill. Liquefaction could cause localized settling of the channel levees and redistribution in channel-bed and bank sediments along the lower Guadalupe River and the baylands (Northwest Hydraulic Consultants 2000).

Methods and Significance Criteria

Bed-load sediment transport was evaluated quantitatively with the Corps' HEC-6 "Scour and Deposition in Rivers and Reservoirs" movable bed numerical model (Northwest Hydraulic Consultants 2001). HEC-6 is a sophisticated transport model of movable bed sediment. It estimates erosion and deposition based on the hydraulic characteristics at numerous cross sections within each river reach. It also considers the depth and texture of the channel-bed and bank materials as well as underlying resistant layers that would limit erosion when calculating channel-bed scour.

Effects of bed and bank erosion, river morphology, and geologic hazards in the LGRP were evaluated qualitatively based on the results of numerical modeling described above and on professional judgment.

The following criteria were used to evaluate the significance of impacts on fluvial geomorphology and geologic hazards. These criteria are based on the State CEQA Guidelines, District guidelines, and professional judgment. LGRP construction and operation activities would result in a significant effect if they would

- substantially increase channel-bed or bank erosion,
- be located on a geologic unit or soil that is unstable or that would become unstable as a result of the project,
- substantially alter riverbed and bank stability, or
- substantially alter existing riffle/run/pool ratios.

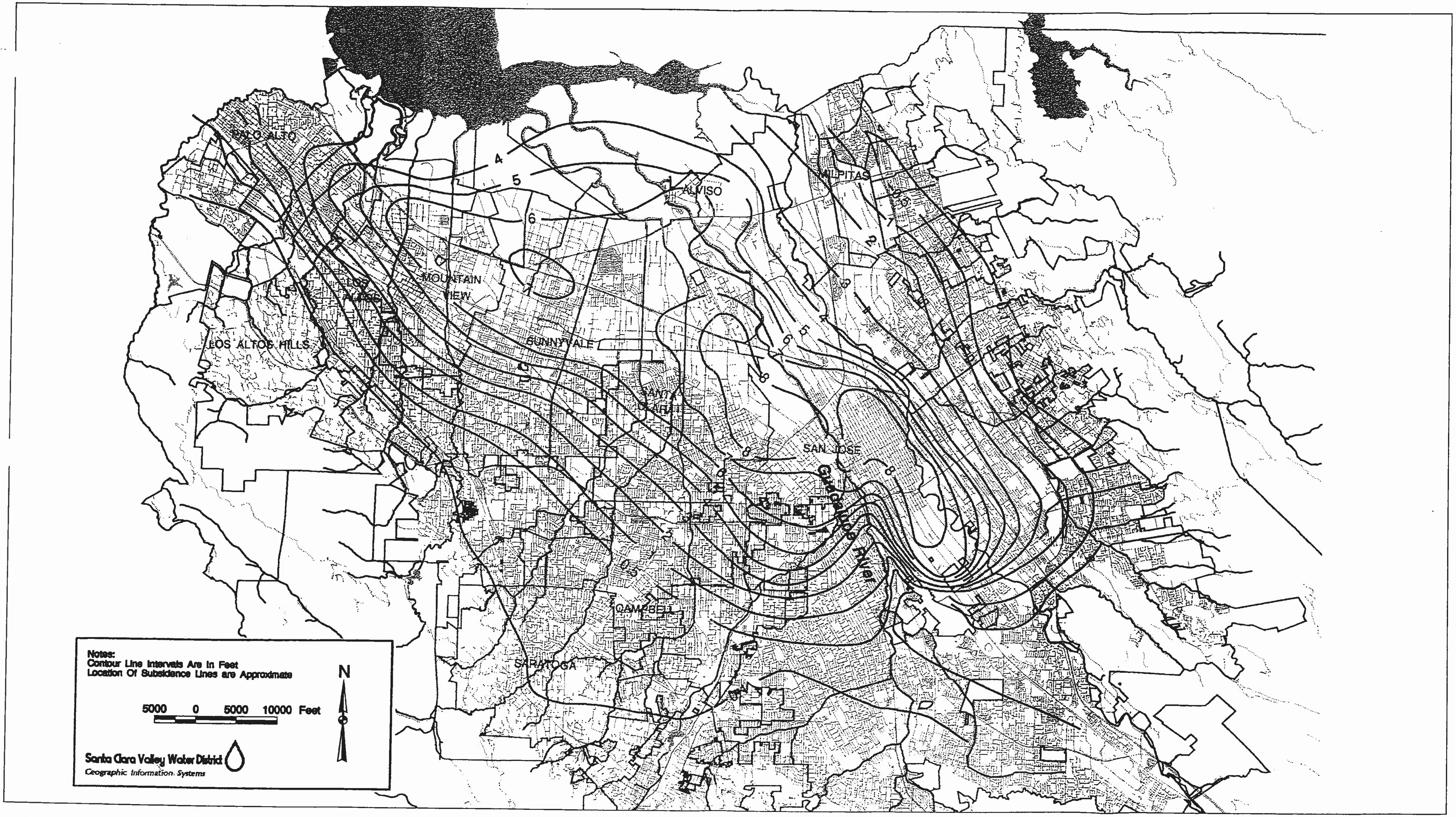


Figure 3-19
Lines of Equal Subsidence in
Santa Clara Valley, North County, 1934–1967

The impact analysis below assumes a 17,000 cfs floodflow. Potential impacts associated with the additional 1,350 cfs of interior drainage entering the Guadalupe River are addressed in chapter 4, "Cumulative Impacts."

Alternative 1: No Project

Under the No-Project Alternative, the District would continue channel-maintenance procedures in the lower Guadalupe River that are currently performed (refer to chapter 2 under the No-Project Alternative description). The District conducts limited maintenance activities within the reaches between I-880 and UPRR, including removal of large woody debris if the debris could block or otherwise impede floodflows, and limited sediment removal at bridges and drainage outfalls and on maintenance roads. The District would continue to conduct vegetation-management activities to maintain current vegetative cover and limited sediment removal to maintain current conveyance capacity. Bank-stabilization measures would continue to be implemented only when necessary to protect adjacent properties and public facilities. These limited maintenance activities would have no effect on channel morphology.

Sediment-transport capacity under the No-Project Alternative would be the same as under existing conditions. Active channel-bed and bank erosion would continue in some areas of reach A because of flows that are relatively starved of sediment. Substantial quantities of gravels, sands, and silts would continue to be deposited downstream of Trimble Road toward San Francisco Bay. Limited sediment removal under the No-Project Alternative would not change the current channel deposition processes and the amount of channel deposition would continue to increase. Localized transport and deposition of bed-load sediment such as cobbles, gravels, and sands would continue, depending on the magnitude and duration of a particular flow event. The current riffle/run/pool ratios would remain the same as under existing conditions or change in response to flow events.

The No-Project Alternative would not change bank stability or increase susceptibility to geologic hazards compared to existing conditions.

Alternative 2: Floodwalls/Levee Raise (Proposed Project)

Impact: Potential for Increased Channel Erosion and Deposition

Under the Proposed Project, the potential for channel erosion and deposition in the lower Guadalupe River would be essentially the same as under existing conditions because implementing this alternative would not substantially alter the hydraulic characteristics of the channel that affect sediment transport. Except in reach C, the Proposed Project would not substantially alter the velocity of floodflows. As discussed in the "Hydrologic and Hydraulic Conditions" section of this chapter, preliminary hydraulic analyses indicate that velocities could increase substantially in reach C compared to existing conditions. As described in chapter 2, "Proposed Project and Alternatives," vortex rock weirs have been specified in this reach because of the increased velocities. Table 3-10 shows the results of the HEC-6 sediment study for various flood events under channel conditions similar to those that would occur under the Proposed Project.

In addition, hydraulic modifications to the channel to accommodate floodflows generally have no effect on the rates at which wash-load sediments are delivered to the mouth of a river—in this case, to San Francisco Bay—because of the very small size of these sediments.

The Proposed Project would not result in a significant adverse impact on channel erosion or deposition; therefore, no mitigation is required.

Impact: Potential Changes in River Morphology as a Result of Structural Flood-Control Elements

Construction of the Proposed Project would modify the existing lower Guadalupe River channel to increase conveyance capacity for the design flood event; however, most major LGRP structural elements would be located within the footprint of the existing levee. Although vortex rock weirs to be installed in reach A and maintenance road ramps under bridges would have localized effects on channel form and location of scour pools, the structures would be designed to convey the channel-maintenance flow and sediment in a manner similar to existing conditions. Operation of the LGRP would have no effect on the magnitude and duration of flows responsible for channel maintenance (i.e., bank-full discharge). Consequently, because there would be no change in long-term channel-

Table 3-10. Guadalupe River HEC6t Run (Preliminary Lower Guadalupe River Flood Protection Project Conditions)*

	Sediment Delivered to Project Area (Tons)													
	2-Year Flood		5-Year Flood		10-Year Flood		25-Year Flood		50-Year Flood		Design Flood		Average Annual	
Bridge	Sand	Silt & Clay	Sand	Silt & Clay	Sand	Silt & Clay	Sand	Silt & Clay	Sand	Silt & Clay	Sand	Silt & Clay	Sand	Silt & Clay
After 3 Days (Peak Flow)														
UPRR	15	7,381	24	24,082	74	47,993	553	92,774	1,566	144,777	2,679	167,122	101	19,260
SR 237	15	7,381	26	24,082	133	47,993	841	92,774	2,185	144,777	3,583	167,122	140	19,260
Tasman	13	7,381	37	24,082	240	47,993	1,286	92,774	3,106	144,777	4,925	167,122	202	19,260
Montague	90	7,381	26	24,082	1,278	47,993	5,471	92,774	11,303	144,777	18,563	167,122	862	19,260
Trimble	699	7,381	4,127	24,081	9,622	47,990	20,682	92,772	34,027	144,771	48,828	167,116	3,875	19,259
U.S. 101	1,337	7,377	5,333	24,078	10,617	47,984	23,103	92,764	38,942	144,759	57,838	167,097	4,693	19,256
I-880	2,175	7,351	5,782	24,053	10,325	47,956	17,886	72,713	27,228	144,702	34,191	167,003	4272	19,237
After 8 Days (End of Hydrograph)														
UPRR	17	13,270	47	45,190	105	90,158	606	176,395	1,828	283,224	3,365	369,519	125	37,079
SR 237	25	13,270	61	45,190	166	90,158	926	176,395	2,633	283,224	4,666	369,519	180	37,079
Tasman	54	13,270	97	45,190	278	90,158	1,442	176,395	3,876	283,224	6,638	369,519	273	37,079
Montague	162	13,269	752	45,189	1,890	90,158	6,760	176,393	15,131	283,224	25,545	369,519	1,231	37,078
Trimble	1,329	13,268	6,382	45,189	13,569	90,155	30,012	176,393	51,900	383,239	79,038	369,514	5,925	37,078
U.S. 101	2,159	13,264	8,508	45,185	15,838	90,147	33,701	176,384	56,874	283,226	86,503	369,492	7,115	37,074
I-880	3,412	13,228	9,848	45,154	17,461	90,114	34,644	176,328	52,246	283,166	73,692	369,391	7,665	37,050

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* Preliminary results are based on conceptual project designs that have changed during the preliminary design process; therefore, the results presented are subject to change. However, the magnitude of results is adequate to evaluate the effects of the Floodwalls/Levee Raise and Channel Bank Modification Alternatives on sediment transport capacity.

Source: Northwest Hydraulic Consultants 2000.

maintenance processes that control the ratios of riffles, runs, and pools, this impact is considered less than significant. No mitigation is required.

Impact: Potential Changes in River Morphology as a Result of Channel-Management Activities

Sediment- and vegetation-management activities under the Proposed Project would require removal of sediment and vegetation and routine maintenance of the channel as discussed in chapter 2, "Proposed Project and Alternatives," and chapter 6 of the Engineer's Report. Proposed vegetation management would have a minor effect on river morphology because vegetation would not be removed from or immediately adjacent to the low-flow channel.

Sediment management in reaches B–E would require excavating sediment in overbank areas (i.e., channel areas between the maintenance roads and the vegetative buffer adjacent to the low-flow channel). Sediment-removal activities in these areas would have only minor long-term effects on river morphology because

- sediment would not be excavated from the low-flow channel,
- a vegetated buffer would be preserved adjacent to the low-flow channel to prevent channel migration, and
- sediment would be excavated only in areas that have been excavated previously as part of previous flood protection projects on the lower Guadalupe River.

Therefore, this impact is considered less than significant. No mitigation is required. However, the District also will implement an adaptive management plan to monitor potential changes in river morphology.

Impact: Potential Decrease in Susceptibility of Lower Guadalupe River Levees to Geologic Hazards

As described in chapter 6 of the Engineer's Report, under the Proposed Project, areas of the levee system that do not meet District standards would be repaired before the levees are raised or floodwalls added. These improvements and continued management of vegetation growing on the levee faces would increase the factor of safety of the lower Guadalupe River levees under static and dynamic (i.e., seismic) conditions. These improvements are considered beneficial impacts. No mitigation is required.

Alternative 3: Channel Bank Modification

Impact: Potential for Increased Bank Erosion

Under the Channel Bank Modification Alternative, removing and replacing the inner slopes of the levees with a nearly vertical wall in reaches D–G could result in potential for bank erosion during floodflows. Excessively steepened slopes in the channel could be more susceptible to erosion, slumping, and other slope failures that could undermine the safety of the levee structures in extreme cases.

Under the Channel Bank Modification Alternative, however, levee slopes would not be simply cut away without reinforcement. The proposed construction methods include removing a large portion of the levees down to their foundations and reconstructing them with engineered soil-reinforcement methods that would greatly increase slope stability. The newly exposed channel bottom and existing access roads would be regraded and covered with concrete cellular mattresses or a similar hardened surface to prevent erosion. The resulting levee structure with channel modification would be stronger and more erosion-resistant than the existing levees; therefore, this impact is considered less than significant. No mitigation is required.

Impact: Potential for Increased Channel Erosion and Deposition

Similar to the Proposed Project, under the Channel Bank Modification Alternative, the potential for channel erosion and deposition in the lower Guadalupe River would be essentially the same as under existing conditions. Implementing this alternative would not substantially alter the hydraulic characteristics of the channel that affect sediment transport. Table 3-10 shows the results of the HEC-6 sediment study for various floods under channel conditions similar to those that would occur under the Channel Bank Modification Alternative.

The Channel Bank Modification Alternative would not result in a significant adverse effect on channel erosion or deposition because this alternative would not result in a substantial charge in channel characteristics that could increase channel erosion and deposition; therefore, no mitigation is required.

Impact: Changes in River Morphology as a Result of Structural Flood-Control Elements

Construction of the Channel Bank Modification Alternative would modify the existing channel to increase conveyance capacity for the design flood event; however, all major LGRP structural elements would be located outside the low-flow channel at the toe of the existing levees in reaches D–G. In addition, channel-modification structures in reaches D–G would not affect the existing channel-invert elevation or slope and would have no direct effect on the riffles, runs, or pools in the low-flow channel. Channel-modification structures in reaches D–G would not alter the current river morphology because these structures would not be located near the low-flow channel and because a vegetative buffer area adjacent to the low-flow channel would be preserved.

As described for the Proposed Project, under the Channel Bank Modification Alternative, vortex rock weirs that would be installed in reach A would have localized effects on channel form and the location of scour pools; however, the features would be designed to convey the channel-maintenance flow and sediment in a manner similar to existing conditions. As described for the Proposed Project, operation of the LGRP under the Channel Bank Modification Alternative would have no effect on the magnitude and duration of channel-maintenance flows. Consequently, because there would be no change in long-term channel-maintenance processes, this impact is considered less than significant. No mitigation is required.

Impact: Potential Changes in River Morphology as a Result of Channel-Management Activities

Sediment- and vegetation-management activities that would be required under the Channel Bank Modification Alternative would require removing sediment and vegetation as presented in chapter 2, "Proposed Project and Alternatives," and chapter 6 of the Engineer's Report. As described for the Proposed Project, vegetation management under the Channel Bank Modification Alternative would have a minor effect on river morphology. Sediment management in reaches B–E would require excavating sediment in overbank areas. As described for the Proposed Project, sediment-removal activities in these areas would have only a minor long-term effect on river morphology because

- sediment would not be excavated from the low-flow channel,
- a vegetated buffer would be preserved adjacent to the low-flow channel to prevent channel migration, and

- sediment would be excavated only in areas that have previously been excavated as part of previous flood protection projects on the lower Guadalupe River.

This impact is considered less than significant; therefore, no mitigation is required.

Impact: Potential Decrease in Susceptibility of Lower Guadalupe River Levees to Geologic Hazards

Implementing the Channel Bank Modification Alternative would include essentially rebuilding the levees in reaches C–G as described in chapter 2, "Proposed Project and Alternatives," and chapter 6 of the Engineer's Report. As described for the Proposed Project, the Channel Bank Modification Alternative improvements would increase the factor of safety of the LGRP levees under static and dynamic (i.e., seismic) conditions. These improvements are considered beneficial impacts; therefore, no mitigation is required.

Alternative 4: Channel Bypass

Alternative 4, the Channel Bypass Alternative, would have little or no effect on geomorphology of the river channel. Although a bypass system has the potential to alter the river's geomorphic processes by diverting a portion of the bedload sediments, this system would be designed so that only flows exceeding 42.5 cms (1,500 cfs) would be diverted. Because the bypasses would not become operational until larger flows occur, the channel maintenance flows would not be altered. Similar to the Proposed Project, channel maintenance flows under Alternative 4, which are largely responsible for maintaining dimensions of the active channel, would be the same as under existing conditions.

In addition, as a result of this design only wash load sediments, which would normally be carried through the river to the bay, and a portion of the fine bed load sediments that currently settle near the Tasman Bridge would be diverted away from the bypassed reaches during large flood events. Because the quantity of sediment moved during large flood events is so large, minor redistribution of the fine sediments would most likely have no substantial adverse or beneficial effects on channel bed maintenance.

Baylands Mitigation Measure

Impact: Potential Changes in Patterns of Sediment Deposition

Implementing the Baylands Mitigation Measure would not significantly change the discharge of sediment to San Francisco Bay during large flood events because, according to the UNET model, approximately 27% of the total storm volume enter the affected salt ponds. However, wash load ~~and~~ including some finer gradations of sands would be carried into the salt ponds and Pond A6. Based on the sediment transport analysis, the washload concentration would be approximately 3.4 parts per thousand (5.5 cubic yards/af). ~~As shown in table 3-5,~~ Implementation of the Baylands Mitigation Measure would increase the volume of floodwaters entering ~~the~~ Ponds A5, A6, A7, A8D, and A8W ~~would increase~~ by approximately 2.1 million cubic meters (1,725 acre feet) ~~1,500 af~~ or ~~13%~~ 18%. The total sediment load would also increase by a maximum of 18% ~~13%~~, assuming that the fine sediments are evenly distributed throughout the water column; however, with the Baylands Mitigation Measure implemented, pumps would remove a portion of this additional sediment load.

~~Because it is unlikely that sediment would be uniformly distributed in floodflows (heavier materials would be closer to the bottom), and because the temporary pumps described in Mitigation Measure HH-3 would remove floodwaters along with a portion of the suspended sediments (even if pumping is delayed several weeks to allow the heaviest materials to settle out and the water is pumped from floating intake valves), i~~ It is unlikely that there would be substantial sediment deposition within the Cargill Salt Ponds under the Proposed Project with the Baylands Mitigation Measure. Under a worst case situation in which all sediment entrained in flood waters that entered the ponds settled out, the Baylands Mitigation Measure would only increase the thickness of sediments 7% to 10%, or approximately 7 mm (0.3 inch) to 8 mm (0.32 inch). In Pond A6, which under the Proposed Project would not be flooded, the sediment accumulation related to the Baylands Mitigation Measure would be only 2 mm (0.8 inches) thick. Therefore, this impact is considered less than significant. No mitigation is required.

Impact: Potential Changes in River Morphology

Under the Baylands Mitigation Measure, channel-forming flows would remain in the natural channel and overflow into the Cargill Salt Ponds only during large flood events. Because floodflows would be infrequent, downstream river morphology would not be changed by these flows. This impact is considered less than significant. No mitigation is required.

Water Quality

Water quality in a given area of a flowing stream section is influenced largely by processes and activities that take place in upstream areas of the drainage basin or watershed. In a natural system, surface-water quality depends primarily on the mineral composition of the rocks in the upper source areas of the stream. Farther downstream, the water quality is influenced by the mineral characteristics of the materials through which it flows and by contributions from tributaries. In an urban or developed system such as the lower Guadalupe River, water quality is also affected by discharges from point and nonpoint sources.

The SFBRWQCB has primary authority for ensuring that water resources are protected from degradation by pollutant discharges. Beneficial uses of the major rivers and groundwater basins, along with narrative and numerical water quality objectives, are established in the water quality control plan (Basin Plan) for the region (SFBRWQCB 1995). Existing beneficial uses of the Guadalupe River are noncontact water recreation, warm freshwater habitat, and wildlife habitat. The Basin Plan also identifies several potentially beneficial uses, including fish migration, contact water recreation, and fish spawning habitat. The Basin Plan is periodically reviewed and updated pursuant to the Porter-Cologne Water Quality Control Act of 1975.

EPA has also promulgated freshwater and saltwater criteria for 126 priority pollutants (13 heavy metals, asbestos, and 112 organic compounds) in the National Toxics Rule. The State of California is currently developing the California Toxics Rule, which would promulgate new water quality criteria for the priority pollutants and supersede the National Toxics Rule in California.

The SFBRWQCB is required to identify water bodies that do not meet water quality objectives pursuant to Section 303(d) of the CWA. Table 3-11 lists waters in the Guadalupe River watershed that have been designated as impaired and the pollutants for which they were designated. The table also shows pollutants in south San Francisco Bay that contribute to the river's designation as an impaired water body. The designation as impaired can be the result of pollutants, such as heavy metals or pesticides, or a physical property of the water, such as dissolved oxygen or temperature.

Table 3-11. Waters in the Guadalupe River Watershed Listed as Impaired by the San Francisco Bay Regional Water Quality Control Board under Section 303(d) of the Clean Water Act

Water Body/Waterway	Listed Impairment (Pollutant)
Calero Reservoir	Mercury
Guadalupe Reservoir	Mercury
Alamitos Creek	Mercury
Guadalupe Creek	Mercury
Guadalupe River	Mercury
Guadalupe River	Diazinon
San Francisco Bay, South	Diazinon
San Francisco Bay, South	Copper
San Francisco Bay, South	Mercury
San Francisco Bay, South	Nickel
San Francisco Bay, South	Selenium
San Francisco Bay, South	Polychlorinated biphenyls (PCBs)
San Francisco Bay, South	Chlordane
San Francisco Bay, South	Dieldrin
San Francisco Bay, South	Nonnative species

Source: State Water Resources Control Board 1999.

Section 303(d) also requires preparation of TMDL plans for impaired waters identified by the state. A TMDL quantitatively establishes the amount of a pollutant allowable in a water body and specifies an allowable load of the pollutant from individual sources that can be discharged in compliance with water quality standards. TMDL plans for impaired waters in the Guadalupe River watershed are in various stages of development. Mercury contamination is considered a regional problem in the Guadalupe River watershed that results from past mining activities for cinnabar, an ore that contains mercury. The SFBRWQCB recently released a public draft TMDL and implementation plan for mercury covering the entire San Francisco Bay region (SFBRWQCB 2000). The District is the head of a stakeholder effort to assist the SFBRWQCB in developing a TMDL for the Guadalupe River watershed. This TMDL is anticipated to be complete in 2004.

In 1990, EPA issued regulations concerning applications by municipalities for NPDES permits covering municipal stormwater. EPA has delegated to the SWRCB and local RWQCBs the authority to issue and enforce these permits. The Santa Clara Valley Urban Runoff Pollution Prevention

Program (SCVURPPP) was implemented to address NPDES permit application requirements. The SCVURPPP is a coalition of 15 local agencies that work together to help prevent pollution in urban runoff from reaching Santa Clara Valley creeks or San Francisco Bay.

Water pollution that is produced from widespread sources or large land areas and that has no single location of discharge to the stream is called *nonpoint source pollution*. Nonpoint source pollutants can enter the lower Guadalupe River through urban runoff, groundwater discharge, and atmospheric deposition. In and upstream of the LGRP area, almost all surface-water contamination results from nonpoint source runoff. There are no well-defined point sources of pollutants, such as wastewater treatment plant discharges, that discharge into the Guadalupe River watershed; however, there are storm drains that convey nonpoint source runoff to the lower Guadalupe River within well-defined outlet structures. In general, nonpoint source pollutants include

- inorganic chemicals (salts, metals, and biostimulatory nutrients, such as nitrogen and phosphorus);
- suspended solids;
- pesticides;
- bacteria; and
- oil and grease that accumulate on the land surface.

During dry periods, these accumulated pollutants can be lifted from the land surface and transported by wind. At the beginning of the rainy season, the accumulated pollutants are washed off land and other surfaces, or they can percolate through the soil to the groundwater and be conveyed to streams.

USGS compiled water quality data for the Guadalupe River intermittently from 1949 through 1994 from samples collected on 36 separate occasions. The samples were collected immediately downstream of the confluence of the Guadalupe River with Los Gatos Creek. Although samples were collected upstream of the LGRP area, there are no other tributary inflows that would change the water quality characteristics. The samples were analyzed for a broad range of physical and chemical constituents of concern. Parameters measured included flow, temperature, dissolved oxygen, pH, hardness, turbidity, nutrients (nitrogen and phosphorus), and trace metals.

A review of the data indicates that Guadalupe River water is relatively hard. The majority of low-flow summer hardness concentrations are greater than

300 milligrams per liter (mg/L), which is indicative of high inorganic mineral content. The pH levels, which indicate the balance of acids and bases, generally range from 7.5 to 8.0, or slightly above neutral (U.S. Army Corps of Engineers 2000).

Suspended Solids and Biostimulatory Nutrients

Suspended solids are generated when dry soils are disturbed and discharged directly to a water body or carried to the receiving water in overland runoff. High concentrations of suspended solids in streams cause many adverse consequences, including

- increased turbidity,
- reduced light penetration,
- reduced ability of predators that rely on sight to capture prey,
- clogged gills of fish and aquatic invertebrates,
- reduced spawning,
- reduced survival of juvenile fish, and
- reduced angling success.

Additional impacts, such as smothering of the benthic community and changes in the composition of the bed substrate, result when the sediment is deposited in slow-moving receiving waters. Sediment is also an efficient carrier of toxic organic substances and trace metals. Once deposited, pollutants in these enriched sediments can be remobilized under suitable environmental conditions and pose a risk to benthic life (Gavin and Moore 1982). USGS measurements indicate that turbidity in the Guadalupe River fluctuates, with higher levels during winter and much lower levels during summer low-flow conditions.

Soil and sediment typically contain large amounts of nutrients, particularly phosphorus, that can stimulate the growth of plants and algae. Excessive growth of plants and algae can reduce the aesthetic appeal of the water for recreational users, clog the habitat used by other aquatic organisms, and cause other nuisance conditions. Excessive levels of phosphorus and nitrogen in urban runoff can lead to undesirable algal blooms in downstream receiving waters, a process known as *eutrophication*. Generally, phosphorus is the controlling nutrient in freshwater systems.

Bioassays (Occoquan Watershed Monitoring Laboratory 1983) indicated that the typical nutrient concentrations in urban runoff are more than sufficient to stimulate excessive algal growth because a majority of these nutrients are present in soluble forms that are readily used by algae. High nutrient levels also promote the growth of dense mats of green algae that attach to rocks and cobbles in shallow, unshaded streams. Finally, nutrient loads can contribute to eutrophication in both fresh and tidal waters. Nutrient export is generally greatest from urban developed sites that have large areas of impervious surfaces; however, nutrient export can also be excessive from land uses that receive unusually high applications of fertilizers, such as golf courses, cemeteries, and other intensively managed areas.

USGS measurements in the Guadalupe River for turbidity range from 1.5 to 800 nephelometric turbidity units (NTUs) with an average of 99 NTUs. During summer when streamflow is low, turbidity ranges from 1.5 to 44 NTUs. Concentrations of turbidity and nutrients are highest during winter months when rainfall provides the majority of runoff (appendix B).

The USGS data also indicate moderate levels of nutrients, 0.05–0.25 mg/L for phosphorus and 1–3 mg/L for nitrogen. The measured nutrient levels are not considered excessive and are not expected to lead to extensive nuisance algal growth. There are no data from the Guadalupe River for algal growth or associated chlorophyll levels; therefore, the extent of eutropic conditions cannot be fully evaluated. The presence of creeping macrophytes such as water primrose is an indication of the eutropic conditions.

Toxic Constituents

Several studies have been conducted locally and nationally to characterize toxic constituents in urban runoff. As defined by EPA, priority pollutants are those that are suspected or known to represent risks to human health. In a national study, heavy metals were observed to be the most prevalent priority pollutants found in urban runoff, with concentrations far exceeding those of organic compounds (U.S. Environmental Protection Agency 1983). In many cases, heavy metal concentrations at National Urban Runoff Program (NURP) sampling sites were found to exceed EPA ambient water quality criteria and drinking water standards. A majority of the trace metals measured in water samples are attached to sediment, which effectively reduces the level of trace metals immediately available for biological uptake and subsequent bioaccumulation. Metals associated with sediment rapidly settle out of the water column and accumulate in soils and aquatic sediments (Occoquan Watershed Monitoring Laboratory 1983, Gavin and Moore 1982).

Urban runoff may contain petroleum hydrocarbons from leakage of automotive oils and greases. Petroleum hydrocarbons are a concern because of their potential toxicity to aquatic organisms at low concentrations (Tanacredi and Stainken 1981, Stenstrom et al. 1984). As might be expected, petroleum hydrocarbon levels are highest in the runoff from parking lots, roads, and gasoline stations. Residential land uses generate less hydrocarbon export, although illegal disposal of waste oil into storm sewers can be a local problem.

Petroleum hydrocarbons in the Guadalupe River are not routinely monitored; however, some generalizations can be made regarding the likely presence of these constituents in runoff from the highly urbanized areas in and surrounding San Jose. Numerous studies performed throughout the United States (Schuler 1986) have reported average hydrocarbon levels of 2–10 mg/L during storms. Hydrocarbons are lighter than water and are initially found in the form of a rainbow-colored film on the water's surface; however, hydrocarbons have a strong affinity for sediment, and much of the hydrocarbon load eventually adsorbs to sediment particles and settles out of the water column. Hydrocarbons tend to accumulate rapidly in the bottom sediments of lakes and estuaries (Wakeham 1977, Tanacredi and Stainken 1981), where they may persist for long periods and exert adverse impacts on benthic organisms (Whipple and Hunter 1979).

The SCVURPPP conducted a regional assessment of stormwater pollutant loads to identify pollutants of concern entering south San Francisco Bay from adjacent land areas, their sources, and measures needed to control these pollutants (Woodward-Clyde Consultants 1991). *Pollutant load* refers to the total mass of pollutants transported in surface runoff and streamflow. The SCVURPPP study showed that constituents of urban runoff vary considerably within and between storm events and from site to site.

Table 3-12 shows the mean annual pollutant loads for the Guadalupe River and Los Gatos Creek and the total load contributed to San Francisco Bay. The Guadalupe River basin contributes approximately one-third of the pollutant load in San Francisco Bay that originates from the south bay. The data also indicate that the pollutant load is greater from residential land uses than from either industrial or open-space land use categories and that mercury, lead, copper, and zinc are present at detectable levels in the Guadalupe River.

Table 3-12. Mean Annual Wet-Weather Pollutant Loads for the Guadalupe River and Los Gatos Creek and the Total Loads to San Francisco Bay from the Santa Clara Valley Urban Runoff Pollution Prevention Program Area* (lb/yr)

Constituent	Guadalupe River				Los Gatos Creek			San Francisco Bay			
	Industrial and Use	Residential Land Use	Open Space	Total	Residential Land Use	Open Space	Total	Industrial Land Use	Residential Land Use	Open Space	Total
Flow (af)	2,170	15,649	8,108	25,927	2,764	283	3,047	4,859	49,218	26,205	80,283
Cadmium	44	94	17	155	17	1	17	99	295	54	449
Chromium	442	1,719	422	2,583	304	15	318	989	5,407	1,364	7,761
Copper	469	3,232	298	3,999	517	10	581	1,051	10,164	964	12,179
Lead	995	3,268	111	4,375	577	4	581	2,228	10,279	360	12,867
Nickel	735	4,013	935	5,683	709	33	741	1,645	12,622	3,023	17,290
Zinc	7,050	8,684	179	15,913	1,534	6	1,540	15,784	27,311	579	43,674
Nitrate (NO_3)	4,083	34,342	4,575	43,000	6,065	160	6,225	9,141	108,009	14,788	131,937
Total Kjeldahl Nitrogen	8,851	78,837	20,423	108,112	13,924	712	14,637	1,918	247,952	66,009	333,778
Ortho-phosphate	10,727	33,148	10,877	54,752	5,854	379	6,234	24,017	104,292	35,155	163,424
Biochemical Oxygen Demand	79,652	452,206	120,427	652,284	79,868	4,201	84,068	178,333	1,422,233	389,226	1,989,792
Total Suspended Solids	3,267,171	11,817,256	6,838,700	21,923,126	2,087,145	238,537	2,325,682	7,314,906	37,166,432	22,103,102	66,584,439

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* This table indicates that the Guadalupe River contributes a significant portion of the total pollutant load discharged to San Francisco Bay from the SCVURPP area. It also indicates that pollutant loads are greatest from residential land uses.

Source: Woodward-Clyde Consultants 1991.

Concentrations of metals detected in USGS samples are generally well below National Toxics Rule criteria (U.S. Army Corps of Engineers 2000); however, samples occasionally exceeded criteria for chromium, copper, lead, nickel, and zinc. The detection limits used for analysis of cadmium and lead in some of the samples were higher than the National Toxics Rule criteria; therefore, comparison to the National Toxics Rule criteria is not possible.

Mines such as the Almaden Quicksilver cinnabar (mercury) mine, which operated for many years in the upper Guadalupe River watershed, are known to be a source of the mercury in the watershed. Leaching of mine tailings and overland flow of mercury-rich soils have resulted in the downstream accumulation of mercury in the Guadalupe River watershed. The mercury problem is, in large part, a legacy of the California gold-mining era because mercury was used to extract gold.

The New Almaden mine is located on lands that are now part of the approximately 1,620-hectare (4,000-acre) Almaden Quicksilver County Park, which is owned by the Santa Clara Parks and Recreation Department. Additional mines include the Guadalupe Mines adjacent to Guadalupe Creek at the Guadalupe Landfill. As a result of this intensive mining, tributaries of the Guadalupe River, including Guadalupe Creek and Alamitos Creek, as well as the Guadalupe River itself, have been contaminated with mercury. There are large quantities of mercury within the river-bottom sediments and riverbank soils of these waterways as a product of mercury extraction in the watershed.

Several complex physical and chemical factors affect the solubility of mercury in water and its availability for uptake in aquatic organisms. Although mercury is primarily found in a sediment-bound form, sediment-bound mercury may still be available to aquatic organisms; therefore, it remains a pollutant of concern. The greatest concern with regard to the accumulation of mercury-laden sediments in the watershed is the potential for sediment-bound mercury to transform to dissolved and methylated forms that can be readily absorbed by aquatic organisms (plant uptake is considered insignificant).

The solubility of mercury in fresh water is affected by several chemical and physical factors, but is generally low. Factors conducive to methylation of mercury include low-flow or stagnant waters, hypoxic or anoxic conditions in the water column, low pH (<6), and high concentrations of dissolved carbon. Most of these factors are affected, in turn, by biological processes such as metabolism, growth, and decay. Because methylation is affected by biological processes, it is likely that the rate and quantity of methyl mercury formation changes seasonally.

Samples of river-bottom sediments and bank soils were collected along the downtown reach of the Guadalupe River, upstream of the LGRP area, several times between 1991 and 1993 and analyzed for total recoverable mercury wet weight (CH2M Hill 1994, 1995). The results indicated that mercury concentrations ranged from 0.05 (method detection limit) to 49 milligrams per kilogram (mg/kg), with a mean of 4.2 mg/kg and standard deviation of 7.8 mg/kg (total of 40 samples). Results for riverbank soils showed that concentrations ranged from 0.14 to 5.2 mg/kg, with a mean of 1.7 mg/kg and a standard deviation of 1.4 mg/kg (total of 34 samples). More recent sampling on the Guadalupe River between SR 237 and Blossom Hill Road (below Almaden Expressway) documented mercury concentrations of 0.05–0.46 mg/kg in a suite of 10 samples (Tetra Tech 2000).

In June 2000, bank samples were collected on Guadalupe Creek between Camden Avenue and the Almaden Expressway and analyzed for total recoverable mercury wet weight (Tetra Tech 2000). The results for mercury concentrations in the creekbank soils (6-inch depth) ranged from 3.8 to 65 mg/kg, with a mean of 19.7 mg/kg and a standard deviation of 13.8 mg/kg (total of 26 samples).

For the LGRP, 174 samples of bottom sediments were analyzed from 46 locations in areas likely to be disturbed by project construction (overbank areas created as part of previous flood protection projects). Total mercury concentrations averaged 3.1 mg/kg in these samples. In addition, 427 samples of levee (embankment) materials were taken at 74 locations in the LGRP area. Mercury was detected above the soluble threshold limit concentration (STLC) of 0.2 mg/kg in 129 samples but was not detected above the total threshold limit concentration (TTLC) of 20 mg/kg in any sample (Kleinfelder 2001a). If the total concentration or the soluble concentration exceeds the TTLC or the STLC, respectively, the material must be considered as hazardous for disposal in accordance with title 22 of the California Code of Regulations (CCR).

Most analyses for mercury in water samples have not been conducted with detection limits that are sufficiently low to allow evaluation of compliance with the applicable Basin Plan water quality objective for mercury of 0.025 micrograms per liter (μg/L) (U.S. Army Corps of Engineers 2000). Furthermore, samples were analyzed for dissolved mercury rather than total recoverable mercury, on which the Basin Plan water quality objective is based. Dissolved mercury is merely a fraction of total recoverable mercury. On at least 2 occasions, the USGS data showed that mercury concentrations in Guadalupe River water exceeded the Basin Plan water quality objective. It is likely, given that the detection limits were higher than the water quality objective and the parameter measured was dissolved mercury, that the water quality objective was exceeded more frequently than indicated by the USGS data, and that a condition of regular noncompliance continues to exist today. There are no state or federal standards for concentrations of sediment-bound mercury; however, the goal of the TMDL program for mercury in the San Francisco Bay region is to reduce sediment concentrations to less than 0.4 mg/kg.

Temperature

Elevated water temperatures can have significant consequences for organisms adapted to a coldwater environment. A rise in water temperature of only a few degrees Celsius over ambient conditions can reduce the number of, or eliminate, sensitive insects such as stoneflies and mayflies and fish such as trout. In general, sustained summer water temperatures in excess of 21°C (70°F) are considered to be stressful, and perhaps lethal, to many coldwater organisms. Inputs of heat can be critical for many rivers that straddle the geographic and/or thermal borderline between coldwater and warmwater conditions.

The water quality objective for temperature in the San Francisco Bay Basin Plan (June 21, 1995) states that the temperature of any cold or warm freshwater habitats "shall not be increased by more than 2.8°C (5°F) above natural receiving water temperatures." The Basin Plan also states that the natural receiving water temperature of inland surface waters "shall not be altered unless it can be demonstrated to the satisfaction of the SFBRWQCB that such alteration in temperature does not adversely affect beneficial uses."

Several factors can increase summer water temperatures in urban rivers. Of these, 3 factors often act together to increase water temperatures. These factors are listed below.

- The urban landscape, as it heats up on warm summer days, tends to impart a great deal of heat to runoff passing over it.
- There are fewer trees on the urban riverbank to shade the river channel, adding to the warming effect.

- Runoff stored in puddles and other impoundments becomes warmer between storms, even during winter months; this stored runoff can be suddenly released from the impoundments and flow rapidly to the river.

River width and depth also affect water temperature in periods of low-to-moderate flows during spring, summer, and fall. Water that flows in a deep and narrow river gains less heat from the sun than does water in a shallow and wide river under similar conditions.

Only intermittent water temperature data are available for the Guadalupe River before September 1995. In September 1995, the District began measuring water temperatures using continuous recording temperature probes at several locations in the lower Guadalupe River (I-880, U.S. 101, and Montague Expressway); in 1998, as part of the LGRP, the District began collecting additional water temperature data at Airport Parkway, Tasman Boulevard, and Gold Street (appendix C).

Maximum daily temperatures were uniformly near or above 20 °C (70 °F) from July through September in all segments of the lower Guadalupe River from I-880 to Gold Street. Maximum daily temperatures in early spring (March–May) increase steadily from 13 °C to 20 °C (55 °F to 70 °F) and depend largely on the air temperature, incident solar radiation, and amount of flow in the channel. Maximum water temperatures decrease rapidly in October and November with the onset of lower ambient temperatures and fewer hours of daylight. Considerably lower maximum water temperatures in the range of 10–15.5 °C (50–60 °F) were typical from November through March. Environmental effects of water temperature are addressed in further detail in the "Fisheries" section of this chapter.

Because flood-control measures such as vegetation removal and channel dredging could affect water temperature and salinity, the JSATEMP water temperature model was extended to include the lower Guadalupe River and Alviso Slough north to its mouth at Coyote Creek. The JSATEMP hourly water temperature model was originally developed to simulate water temperature changes associated with the construction of the downtown San Jose Guadalupe River project just upstream of the LGRP (U.S. Army Corps of Engineers 2000). The model is in a spreadsheet format and uses hourly meteorological conditions, daily flow rates, and channel characteristics (e.g., shade and water depth) as input variables. Because Alviso Slough and a portion of the lower Guadalupe River are tidally influenced, tidal effects on volume were included in the extended model and electrical conductivity

(EC) was added as a measure of salinity. The model was calibrated to measured data collected in 1998 from the lower Guadalupe River.

Dissolved Oxygen

The amount of oxygen that can be dissolved in water varies with temperature: cold water can contain more dissolved oxygen than warm water. The amount of dissolved oxygen that is present in relation to the amount that could be dissolved at a given temperature is referred to as the *saturation level*. Decomposition of organic matter by microorganisms depletes levels of dissolved oxygen in slow-moving receiving waters, such as estuaries. The degree of potential dissolved-oxygen depletion is measured by the biochemical oxygen demand (BOD) test, which measures the oxidizable matter present in urban runoff. Urban runoff can severely depress levels of dissolved oxygen after summer storms. BOD levels can exceed 10–20 mg/L during storm pulses, which can lead to very low levels of dissolved oxygen in shallow, slow-moving, or poorly flushed receiving water; however, during particularly large storms or low temperatures, oxidizable matter can be flushed through the entire river system before having a chance to adversely affect dissolved oxygen. Factors involved in increasing dissolved oxygen levels include physical mixing and agitation of the water (aeration), photosynthetic production of oxygen by aquatic algae and plants, and lower water temperatures.

Levels of dissolved oxygen measured in the Guadalupe River by USGS indicate that year-round concentrations of dissolved oxygen have been generally greater than 8 mg/L and suitable for aquatic life at all measured temperature conditions (U.S. Army Corps of Engineers 2000). No measurement of dissolved oxygen has been collected in the lower Guadalupe River.

Methods and Significance Criteria

Effects on water quality were evaluated qualitatively based on existing information and professional judgment. The JSATEMP model, originally developed for the Corps' downtown San Jose Guadalupe River project, was revised and calibrated for use as an investigative tool to evaluate potential project effects on water temperatures in the lower Guadalupe River, and was run to establish existing water temperatures. However, the alternatives evaluated in the following sections would have minimal effects on vegetation that shades the water or on low-flow channel geometry that may affect residence time, depth, or area exposed to solar radiation; therefore, they would have no effect on the temperature model input variables. Because the Proposed Project or alternatives would not substantively change conditions along the river that affect the key model input parameters—meteorological conditions, daily flow rates, shade conditions, and water depth—the model was not used to evaluate the project alternatives.

As described in chapter 2, "Proposed Project and Alternatives," an intensive screening process was used to develop the Proposed Project and alternatives. An important screening criterion was to minimize effects on in-channel vegetation, especially wetland and SRA habitat. The action alternatives evaluated in the following sections would not have effects on vegetation that shades the water or on low-flow channel geometry that may affect residence time, depth, or area exposed to solar radiation. Therefore, from the perspective of water temperature modeling, the alternatives would have no effects on the temperature model input variables.

The following criteria were used to evaluate the significance of effects on river water quality. These criteria are based on the State CEQA Guidelines, District guidelines, and professional judgment. Construction and operation of the LGRP would result in a significant effect if they would

- result in a point-source discharge to a receiving body that exceeds state water quality or discharge requirements, standards, or objectives, or result in substantial nonpoint-source contaminants;
- substantially degrade groundwater quality; or
- contaminate a public water supply.

The impact analysis below assumes a 17,000 cfs floodflow. Potential impacts associated with the additional 1,350 cfs of interior drainage entering the Guadalupe River are addressed in chapter 4, "Cumulative Impacts."

Alternative 1: No Project

Under the No-Project Alternative, the District would continue procedures for maintaining the channel that are currently performed. Potential effects on water quality related to those activities are the discharge of herbicides, sediments, and sediment-borne pollutants. It is likely that the ongoing maintenance activities under the No-Project Alternative would have only minor effects on water quality in the lower Guadalupe River because herbicide applications are limited primarily to the levee slopes, well away from the active channel, and are conducted during the summer months when sprayed areas are unlikely to be inundated. Sediment removal is limited primarily to areas at bridge openings, and the materials removed are sands and gravels that do not typically provide adsorption sites for pollutants.

Under the No-Project Alternative, there would be no potential benefits to water quality from removal of sediments in reaches B–E (sediment management areas).

Alternative 2: Floodwalls/Levee Raise (Proposed Project)

Impact: Potential Release of Sediment and Sediment-Borne Pollutants during Construction

Construction activities under the Proposed Project could disturb streambank and channel soils and sediments near existing levees in areas of reaches A and B and in reaches C, D, E, F, and G, depending on the level of construction needed for floodwalls and levees. These construction activities have the potential to increase sediment load to the river through overland runoff and direct deposition into the channel. Erosion at construction sites could also increase concentrations of suspended solids and of biostimulatory nutrients, such as phosphorus and nitrogen compounds, that are often attached to suspended particulate matter and contribute to increased water turbidity.

Any soil disturbance resulting from construction activities would be intermittent and temporary. Implementation of erosion control and hazardous-material-spills response plans under an NPDES general construction activities stormwater discharge permit approved by the SFBRWQCB, in conjunction with other preventive measures required by a DFG streambed alteration agreement, would prevent erosion and increases in suspended solids, biostimulatory nutrients, and turbidity. The stormwater pollution prevention plan (SWPPP), erosion and sediment control plan, and spill prevention and response plan for the Proposed Project, as described in the "Environmental Commitments" section of chapter 2, would identify

BMPs for avoiding water quality effects. These measures may include, but are not limited to

- limiting the months when in-channel construction takes place,
- implementing soil stabilization measures,
- practicing good housekeeping on the construction site,
- containing and isolating hazardous materials such as vehicle fuels and lubricants, and
- monitoring the sites and implementing adaptive management plans.

The likelihood of adverse effects on water quality resulting from construction activities is therefore considered low. Sediment disturbances and potential impacts from turbidity, suspended solids, and biostimulatory nutrients would be minimized through the implementation of pollution control plans. Construction-related effects on water quality are considered less than significant. No mitigation is required.

Impact: Potential for Accidental Spills of Construction Materials

Under the Proposed Project, accidental spills of construction materials, such as concrete, fuels, oil, and sealants, are not expected. Careful adherence to the Proposed Project's spill prevention and response plan, as described in the "Environmental Commitments" section of chapter 2, would ensure that equipment is available, workers are trained, and a management system is in place to prevent or respond to accidental spills. The spill prevention and response plan defines requirements for storage, handling, and containment of hazardous materials to emphasize protection of water quality. Important components of the plan include stipulations that hazardous materials will be stored and construction vehicles and equipment will be maintained outside the river channel. Construction of the Proposed Project would have no adverse effect on water quality; therefore, this impact is considered less than significant. No mitigation is required.

Impact: Potential Degradation of Water Quality As a Result of Channel Management Activities

Under the Proposed Project, the District would conduct initial channel modifications and routine channel maintenance activities that would include sediment removal and vegetation management, as well as removal of woody debris and bank stabilization. The District would also periodically remove accumulated sediment from the LGRP area using sediment and vegetation management techniques described in chapter 2, "Proposed Project and Alternatives," and chapter 6 of the Engineer's Report. The routine sediment removal and bank stabilization activities would be conducted in the LGRP area to preserve the as-built design capacity of the Proposed Project.

Periodic removal of accumulated sediments would remove vegetative cover and disturb the ground surface, potentially exposing bare ground to accelerated erosion by floodflows. Inundation of bare ground by normal winter flows following sediment removal activities could result in increased concentration of turbidity, biostimulatory substances, and sediment-borne pollutants; however, this regular and periodic removal of sediment by the District would be conducted in compliance with SFBRWQCB requirements and follow standard BMPs, as described in the "Environmental Commitments" section of chapter 2, such as

- seasonal limitations to prevent flooding of bare soils,
- reseeding to establish groundcover, and
- retaining vegetative buffers to avoid an increase in suspended solids or any other substantial adverse impacts on water quality.

These channel maintenance requirements and BMPs would be stipulated in the project's final design documents; therefore, this impact is considered less than significant. No mitigation is required.

Impact: Potential Discharge or Mobilization of Toxic Constituents—Mercury

The entire Guadalupe River, its tributaries, and south San Francisco Bay are classified as impaired with regard to mercury contamination under Section 303(d) of the CWA. As described previously, a draft TMDL program and implementation plan have been developed for San Francisco Bay calling for a 92% reduction in the amount of mercury loading currently entering the bay from the Guadalupe River watershed.

The Proposed Project would not change the quantity of mercury that enters the LGRP area from the watershed, or the pattern of its entrance; however, because of the association of mercury with soils and sediments, project construction activities and long-term operations of the project could affect transport and methylation of mercury in the lower Guadalupe River. Therefore, the Proposed Project could affect mercury behavior by increasing the transport and loading of mercury to the San Francisco Bay and the formation of methyl mercury in the lower Guadalupe River.

Construction activities have the potential to disturb soil and sediments that contain mercury. In addition, long-term sediment removal operations could disturb substrate that contains mercury.

During project construction, construction-related erosion and sedimentation would be managed through implementation of an erosion and sediment control plan. As described in the "Environmental Commitments" section of chapter 2, the erosion and sediment control plan would outline procedures and policies to avoid and minimize the discharge of sediment to the Guadalupe River during construction activities. As described, elements of the erosion and sediment control plan would require contractors to

- conduct all construction work in accordance with site-specific construction plans that minimize the potential for sediment input to the stream;
- identify, using construction fencing, all areas that require clearing, grading, revegetation, or recontouring and minimize the extent of areas to be cleared, graded, or recontoured;

- grade spoil sites to minimize surface erosion and apply erosion-control measures as appropriate to prevent sediment from entering watercourses or the stream channel, to the extent feasible;
- mulch disturbed areas, as appropriate, and plant with appropriate species as soon as practicable after disturbance; and
- avoid operating equipment in flowing water by using temporary cofferdams or some other suitable diversion to divert channel flow around the channel and bank construction area.

In addition, a soil management plan, as described in the "Environmental Commitments" section of chapter 2, would be implemented for the LGRP that would provide procedures for classifying soils, as well as procedures and criteria for disposal and reuse. The soil management plan would be updated before project implementation to reflect final project design and to incorporate input from the SFBRWQCB regarding management of soils that contain elevated mercury concentrations. The updated soil management plan would be submitted to the SFBRWQCB for approval before implementation. The following restrictions on soil management would be included in the soil management plan:

- Sediments with mercury concentrations that exceed hazardous waste criteria under federal or state law must be disposed off-site in appropriately licensed disposal sites. The determination of hazardous properties will comply with all applicable statutes and regulations pertaining to hazardous wastes.
- Excavated soils with mercury concentrations not exceeding hazardous waste criteria but greater than 1 mg/kg may not be reused on the site unless such soils are placed above the low-flow channel, or in adjacent areas where frequent exposure to overbank flow is not anticipated to occur above the water-surface elevation defined by the 3-year recurrence interval.
- Excavated surfaces above the 3-year recurrence interval elevation that contain mercury concentrations higher than hazardous-waste levels will be overexcavated and replaced with soils meeting the above criteria for on-site reuse. Excavated surfaces below the 3-year recurrence interval elevation that contain mercury concentrations greater than 1 mg/kg will be overexcavated and replaced with clean imported soil.

The limitations on on-site reuse of excavated soils and sediments would also apply to operation and maintenance activities throughout the life of the Proposed Project.

The 1-mg/kg requirement is based on regulatory guidance from the SFBRWQCB (2000), which states that reducing bank sediment concentrations of mercury to 1 mg/kg or less will reduce the water-column concentration of total recoverable mercury. Mercury in the project area river water presently exceeds Basin Plan numeric water quality objectives; therefore, incorporation of the proposed soil reuse restrictions would result in improved water quality under postproject conditions.

If the materials making up the portions of the existing levees that would be excavated, and the sediments that would be excavated, as part of the LGRP maintenance activities were disposed out of the active channel or off the site, approximately 785 kg (1,730 pounds) of mercury would be removed from the Guadalupe River. This statement assumes that the channel sediment has an average mercury concentration equal to that measured in the LGRP (3.1 mg/kg) (Kleinfelder 2000). Based on SFBRWQCB estimates, the annual wastewater load of mercury for the entire San Francisco Bay is 20–50 kg (44–110 pounds) per year. Implementation of the soil management plan could have a significant beneficial impact on mass loading to the bay.

Implementation of erosion and sediment control and soil management plans would avoid and minimize the potential for increased transport and loading of mercury to San Francisco Bay. Disturbance and subsequent transport of mercury-laden sediments and soils is an identifiable source of mercury loading to San Francisco Bay. The erosion-control measures contained in the erosion- and sediment-control plan could substantially manage project-related erosion, thereby minimizing project effects. Furthermore, the soil management plan would establish threshold criteria whereby mercury-laden soils would be removed from the system. Together, these measures could significantly contribute to the overall reduction in the available mercury that is mobile in the lower Guadalupe River. In particular, the implementation of a soil management plan could result in significant exports of mercury from project reaches to licensed disposal facilities. Therefore, the effects of construction- and operations-related transport and loading of mercury to San Francisco Bay are considered less than significant. No mitigation is required.

Impact: Potential Increase in Methyl Mercury Formation

Any potential increase in the exposure of aquatic organisms to bioavailable mercury would be considered an adverse water quality effect of the Proposed Project; however, there is no evidence to suggest that operation of the LGRP would increase such exposure. The Proposed Project would not affect the development of instream conditions such as wetlands or other anoxic, high-sulfate, low-pH, and high-organic-matter aquatic environments that would be conducive to enhanced methylation because the current channel structure or low-flow channel conditions would not be altered under the Proposed Project. Therefore, this impact is considered less than significant. No mitigation is required.

Impact: Potential for Increased Water Temperature

The JSATEMP modeling conducted for the Corps' downtown San Jose Guadalupe River project identified several general temperature impact mechanisms in the Guadalupe River. Increases in water temperatures are caused primarily by decreases in the amount of SRA cover vegetation along the streambanks of the river. Decreases in streamflow also increase water temperature; temperatures particularly increase in summer when streamflows are relatively low. Flow rates and weather, including humidity and solar radiation, are the primary variables affecting water temperature and would not be affected under the Proposed Project.

Based on evaluation of aerial photography and field visits, the Proposed Project would not have an effect on vegetation that shades the water (SRA cover) or on low-flow channel geometry that may affect residence time, depth, or area exposed to solar radiation; therefore, from the perspective of water temperature modeling, no effects on water temperature would result from construction of flood-control structures or proposed vegetation and sediment management activities. Therefore, it is not expected that implementation of the Proposed Project would have an effect on water temperature. This impact is considered less than significant. No mitigation is required.

Impact: Potential for Reduced Concentration of Dissolved Oxygen

Levels of dissolved oxygen could be affected if temperatures within the LGRP area change because the solubility of dissolved oxygen in water is related to temperature. Because temperature changes are not anticipated with implementation of the Proposed Project, concentrations of dissolved oxygen in lower Guadalupe River water are not expected to change. USGS monitoring data indicate that the levels of dissolved oxygen in the river are generally high and suitable for aquatic life. The effect of the Proposed Project on dissolved oxygen content in the lower Guadalupe River would not change these conditions and is considered less than significant. No mitigation is required.

Impact: Potential Change in Salinity of the Lower Guadalupe River and Alviso Slough

The Proposed Project does not include dredging to increase conveyance capacity in the lower Guadalupe River. However, minor channel excavation (approximately 1 m [3.3 feet]) is proposed as maintenance to control emergent vegetation downstream from SR 237. Extensive dredging in the tidally influenced areas of the lower Guadalupe River would increase the tidal prism (the difference in the volume of water stored in the channel between low and high tides). Increasing the tidal prism could cause a shift in the salinity gradient in the lower Guadalupe River and Alviso Slough.

The Proposed Project would not substantially increase the tidal prism and there would be no effect on salinity in either the river or Alviso Slough; therefore, this effect is considered less than significant. No mitigation is required.

Alternative 3: Channel Bank Modification

Impact: Potential Release of Sediment and Sediment-Borne Pollutants During Construction

Construction activities for the Channel Bank Modification Alternative would disturb streambank and channel soils and sediments in reaches D, E, F, and G. These construction activities have the potential to increase sediment load to the river through overland runoff and direct deposition in the channel. Erosion at construction sites could also increase concentrations of suspended solids and of biostimulatory nutrients, such as phosphorus and nitrogen compounds, that are often attached to suspended particulate matter and contribute to increased water turbidity.

As described for the Proposed Project, any soil disturbance resulting from construction activities would be intermittent and temporary, and implementation of regulatory permit conditions would prevent erosion and increases in suspended solids, biostimulatory nutrients, and turbidity. The SWPPP, erosion and sediment control plan, and spill prevention and response plan, as described in the "Environmental Commitments" section of chapter 2, would identify BMPs for avoiding effects on water quality; therefore, construction-related effects on water quality would be less than significant. No mitigation is required.

Impact: Potential for Accidental Spills of Construction Materials

Accidental spills of construction materials, such as concrete, fuels, oil, and sealants, are not expected. As described for the Proposed Project, careful adherence to the project's spill prevention and response plan, as described in the "Environmental Commitments" section of chapter 2, would ensure that equipment is available, workers are trained, and a management system is in place to prevent or respond to accidental spills; therefore, this impact is considered less than significant. No mitigation is required.

Impact: Potential Degradation of Water Quality as a Result of Channel Management Activities

As described for the Proposed Project, the District would conduct routine channel maintenance activities that include sediment removal and vegetation management, as well as removal of woody debris and bank stabilization. The District would periodically remove accumulated sediment from the LGRP area using sediment and vegetation management techniques described in chapter 2, "Proposed Project and Alternatives." The routine sediment removal and bank stabilization activities would be conducted in the LGRP area to preserve the as-built design capacity of the Channel Bank Modification Alternative. As described previously for the Proposed Project, these activities could result in increased concentrations of turbidity, biostimulatory substances, and sediment-borne pollutants.

This regular and periodic sediment-removal and channel maintenance activity would be conducted in compliance with SFBRWQCB requirements and follow standard BMPs, as described for the Proposed Project, to avoid an increase in suspended solids or any other substantial adverse impacts on water quality. These channel maintenance requirements and BMPs would be stipulated in the project's final design; therefore, this impact is considered less than significant. No mitigation is required.

Impact: Potential Discharge or Mobilization of Toxic Constituents—Mercury

As described for the Proposed Project, the Guadalupe River, its tributaries, and south San Francisco Bay are classified as impaired with regard to mercury contamination. As with the Proposed Project, the Channel Bank Modification Alternative would not change the quantity or patterns of mercury that enters the project area from the watershed; however, because of the association of mercury with soils and sediments, project construction activities and long-term maintenance of the project could affect transport and methylation of mercury in the lower Guadalupe River. Therefore, as under the Proposed Project, the Channel Bank Modification Alternative could affect mercury behavior by increasing the transport and loading of mercury to San Francisco Bay and the formation of methyl mercury in the project reach of the lower Guadalupe River.

Construction-related erosion and sedimentation would be managed through implementation of an erosion and sediment control plan, as described in the "Environmental Commitments" section of chapter 2. The erosion and sediment control plan would outline procedures and policies to avoid and minimize the discharge of sediment to the Guadalupe River during construction activities. In addition, a soil management plan would be implemented for the LGRP that would provide procedures for classifying soils, as well as procedures and criteria for disposal and reuse.

If the materials that make up the portions of the existing levees that would be excavated under the Channel Bank Modification Alternative, and the sediments that would be excavated as part of the LGRP maintenance activities, were disposed of out of the active channel or off the site, approximately 1,427 kg (3,145 pounds) of mercury would be removed from the lower Guadalupe River. This statement assumes that the channel sediment has an average mercury concentration equal to that measured (3.1 mg/kg) in 1998 and 1999 (Kleinfelder 2000). Based on SFBRWQCB estimates, the annual wastewater load of mercury for the entire San Francisco Bay is 20–50 kg (44–110 pounds) per year. Implementation of the soil management plan could have a significant beneficial impact on mass loading to the bay.

The effects of construction- and operations-related transport and loading of mercury to San Francisco Bay are considered less than significant because implementation of erosion and sediment control and soil management plans would avoid, minimize, and potentially reduce the transport and loading of mercury to San Francisco Bay. No mitigation is required.

Impact: Potential for Increased Methyl Mercury Formation

Any potential increase in the exposure of aquatic organisms to bioavailable mercury would be considered an adverse effect of the Channel Bank Modification Alternative on water quality; however, there is no evidence to suggest that operation of the LGRP would increase aquatic-organism exposure. Similar to the Proposed Project, the Channel Bank Modification Alternative would not affect the development of instream conditions such as wetlands or other anoxic, high-sulfate, low-pH, and high-organic-matter aquatic environments that would be conducive to enhanced methylation; therefore, this impact is considered less than significant. No mitigation is required.

Impact: Potential for Increased Water Temperature

As described for the Proposed Project, flow rates and weather, including humidity and solar radiation, are the primary variables affecting water temperature and would not be affected by the Channel Bank Modification Alternative. Similar to the Proposed Project, the Channel Bank Modification Alternative would not have effects on vegetation that shades the water or on low-flow-channel geometry that may affect residence time, depth, or area exposed to solar radiation. This impact is considered less than significant because there are no effects on water temperature. No mitigation is required.

Impact: Potential for Reduced Concentration of Dissolved Oxygen

Levels of dissolved oxygen could be affected if there are changes in temperature within the project area because the solubility of dissolved oxygen in water is related to temperature. Because temperature changes are not anticipated with implementation of the Channel Bank Modification Alternative, no change is expected in the concentration of dissolved oxygen in the lower Guadalupe River; therefore, this impact is considered less than significant. No mitigation is required.

Alternative 4: Channel Bypass

Alternative 4, the Channel Bypass Alternative, would have impacts similar to those of the Proposed Project for construction and channel management activities and could provide a water quality benefit when compared to the Proposed Project. Although this alternative would require a greater quantity of earthwork and a longer construction period, construction-related impacts would still be mitigated to less-than-significant levels by implementing the environmental commitments outlined in chapter 2.

A benefit, however, may be realized by identification and removal of greater quantities of lead, mercury, pesticides, and other contaminants that are present in the existing levee soils from the watershed. The greater extent of excavation may also expose currently unidentified soil or groundwater contamination and lead to additional cleanup activities that provide a benefit to the environment.

Baylands Mitigation Measure

Impact: Potential for Increased Methyl Mercury Formation

Implementation of the Baylands Mitigation Measure may result in trapping additional sediment in the Cargill Salt Ponds and Pond A6. Based on flood volumes presented in table 3-5, there would be a cumulative 37% ~~13%~~ increase in water trapped in the Cargill Salt Ponds compared to existing conditions and Pond A6 would receive approximately 866,000 cubic meters (702 acre-feet) of floodwaters. Assuming that wash load and some finer gradations of sands are evenly distributed in the floodwaters, up to 37% ~~13%~~ more sediment would be carried into the Cargill Salt Ponds where there would be adequate time for deposition of a portion of the suspended sediments. As described previously in this section, there is mercury within the river-bottom sediments and riverbank soils of the Guadalupe River and its tributaries because of mercury extraction in the watershed.

Trapping a greater portion of mercury-laden sediment in the salt ponds and Pond A6 is of concern because flooding in these areas may promote the development of anoxic, high-sulfate, low-pH, and high-organic-matter aquatic environments that could be conducive to formation of methylated mercury (that can be readily absorbed by aquatic organisms). In addition, accumulated mercury-laden sediments may adversely affect Cargill's salt extraction operations and future wetland development in Pond A6 and the elsewhere in the baylands.

~~However, sediment is unlikely to be uniformly distributed in floodflows throughout the water column; therefore, it is unlikely that substantial additional mercury load would be discharged to the salt ponds and Pond A6~~

~~under the Proposed Project with the Baylands Mitigation Measure compared to existing conditions.~~ It is unlikely that the mercury concentrations entering the ponds with floodwaters will be the same under existing and postproject conditions because the Proposed Project does not generate mercury. In addition, it is ~~also~~ unlikely that the resulting mercury concentrations in the pond sediments would be substantially different from the background levels found in the salt ponds or of southern San Francisco Bay. However, this potential impact is considered significant because of the uncertainty of the distribution of mercury in suspended sediments and flood waters. To reduce this impact to a less-than-significant level, the District will implement the following mitigation measure.

Mitigation Measure WQ-1: Develop and Implement a Mercury Monitoring Plan

The District will develop and implement a mercury monitoring plan, in consultation with the SFBRWQCB, to monitor floodwaters and suspended sediments. The purpose of the plan is to determine the concentration of mercury in lower Guadalupe River floodwaters to determine whether they exceed the TMDL objective concentration. This information would then be used to determine whether corrective actions are needed in Pond A6 or Cargill Ponds A8W, A5, A7, or A8D to reduce mercury concentrations. The District will initially collect water and suspended sediment samples during various flood events to characterize and interpret the mercury concentrations in lower Guadalupe River floodwaters (i.e., is mercury concentration linearly proportional to suspended sediment concentration or proportional to a fraction of the suspended sediment, and would concentration limits be exceeded). Once floodflow concentrations are known, the District will estimate the potential mercury load discharged to the ponds by measuring the volume of floodwater in each pond and multiplying by the appropriate concentration, determined by the previous analyses.

If it is determined, by estimation or actual monitoring, that inundation by floodwaters in Pond A6 or the Cargill Salt Ponds caused mercury concentrations in pond sediments to increase more than 10% over the pond's baseline conditions, or if the increase causes the sediment concentration to exceed the TMDL objective concentration of 0.4 mg/kg for bay sediments, whichever is more restrictive, the accumulated sediments would be removed and disposed of in accordance with the soil management plan described in chapter 2, "Proposed Project and Alternatives."

Hazards and Hazardous Materials

This section describes the evaluation of hazards and hazardous materials in each of reaches A–G for the LGRP. It also describes the various federal, state, and local regulations and laws that oversee and govern the control of hazardous materials and hazardous-waste disposal.

Regulations

Federal, State, and Local Legislation

The federal Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) (also known as the Superfund Act) of 1980 (PL 96-510) is intended to protect the public and the environment from the effects of previous hazardous-waste disposal and new hazardous materials spills. CERCLA provides funds to compensate victims and to decontaminate the environment. The Superfund Amendments and Reauthorization Act (SARA) of 1986 (PL 99-499) amends some provisions of CERCLA and provides for a Community Right-to-Know Program.

EPA administers the Resource Conservation and Recovery Act (RCRA) of 1976 (PL 94-580), along with the Hazardous and Solid Waste Amendments of 1984. This legislation provides the principal regulation for the storage, transportation, and disposal of both solid and hazardous waste. RCRA imposes requirements for reporting and permitting activities involving hazardous waste and exercises operational control over those who generate, treat, store, transport, or dispose of hazardous waste.

Various state laws also govern hazardous materials and hazardous-waste management. State hazardous-waste regulations are primarily contained in the California Code of Regulations (CCR), title 22, division 4, *Environmental Health*. The hazardous waste control law lists hundreds of hazardous and potentially hazardous chemicals. In addition, this code establishes criteria for identifying hazardous materials; regulates the storage, transport, and disposal of hazardous wastes; and identifies hazardous wastes that cannot be disposed of on land. The California Department of Toxic Substances Control (DTSC), through division 20, chapter 6.8 of the California Health and Safety Code, is empowered to provide response authority for release of hazardous substances, including spills and hazardous waste disposal sites that pose a threat to the public health or the environment. Water quality regulations, developed from the Porter-Cologne Water Quality Control Act, are designed to protect the quality of waters in California. Title 23 of the CCR contains the water quality regulations pertinent to environmental contamination. The SFBRWQCB and the District administer these regulations in the San Jose area.

The City has adopted a municipal Hazardous Materials Handling and Storage Ordinance (HMSO) addressing the proper storage of hazardous materials in underground storage tanks. The HMSO defines materials requiring regulation, sets standards for existing facilities and the closure of out-of-service facilities, and establishes criteria for reportable discharges. In addition, the HMSO establishes a system of inspections and permits and requires qualifying facilities to prepare a *Hazardous Materials Management Plan* and a *Hazardous Materials Inventory Statement*. The HMSO regulates both new and existing facilities. The City Fire Department is the administering agency for the HMSO.

Investigation and Results

Portions of the lower Guadalupe River cross areas that have experienced a range of past and current industrial and commercial uses, including manufacturing and the underground storage of fuel. As a result, hazardous wastes exist in and along the corridor and could be present during construction and operation of the LGRP. Toxic constituents include lead, copper, zinc, mercury, and nickel. Effects on humans would depend on the amount and concentration of contaminants, the pathways by which the contaminants reach potential receptors, the amount of exposure, and the sensitivity of the receptors.

The *Final Report, Level II Hazardous Materials Investigation Report, Lower Guadalupe River Flood Protection Project* (Kleinfelder 2001a) provides a preliminary evaluation of the extent of soil and groundwater contamination within and adjacent to the LGRP alignment that could affect property acquisition, project construction, and mitigation. The report includes, and its findings are based on, a record review update, an investigation of embankment soil and river sediment, and individual property investigations. It is important to recognize that descriptions of hazardous materials are presented as broad categories that represent probabilities for soil and groundwater contamination. The investigation of sediment evaluates hazardous-materials conditions with the assumption that the LGRP would include 1 or more of the following construction activities along the project alignment:

- widening or building up levees,
- increasing the depth of the channel,
- creating additional mitigation ponds, or
- creating wetlands.

The following information was taken from the Kleinfelder report (2001a) for use in LGRP planning and preliminary analysis and from a June 18, 2001, memorandum from the District that summarized Kleinfelder's findings. Each property evaluated fits 1 of the following categories:

- **High Probability of Soil and/or Groundwater Contamination.** Property contains hazardous material above the regulatory level.
- **Probability of Contamination (Usually Groundwater).** Property may contain hazardous materials above the regulatory levels.
- **No Contamination or Below the Regulatory Threshold.** Property does not contain hazardous material that exceeds regulatory levels. There are no substantial environmental constraints on project construction from soil contamination at these sites.
- **Access Denied—Hazardous Material Unknown.** Access to the property was not permitted during the investigation.

The investigation also evaluated river sediment, embankment soil, geotechnical borings, and storm drains. Where locations were given, summaries of findings in these other areas of investigation are included by project reach. Where no location was identified, such as for river sediment and embankment soil, a general summary of findings for these investigations is provided below.

River Sediment

Out of 172 samples collected from river sediment, only 3 were found to contain mercury and pesticides at concentrations above soil-disposal and NPDES regulatory limits; however, neither mercury nor pesticides could be detected in the subsequent samples collected from adjacent locations. It is not likely that excavated river sediment would require special handling; it could be disposed of at a landfill or reused for construction and would not be classified as hazardous waste. Excavation of river sediment would not constrain project construction; however, sampling and analyses may be required for disposal of river sediments to meet disposal criteria (Kleinfelder 2001a).

Embankment Soil

Twelve of the 85 embankment areas were found to contain metals and pesticides at concentrations above both the soil disposal regulatory limits and NPDES discharge limits. If any of the 12 areas would be excavated during construction, soil to be excavated at the following locations would require segregation, sampling, and analysis before disposal:

- Sta 7+250W to 7+360W (lead—EB7+300W at 2.5 feet and EEB7+301W at 4.5 feet);
- Sta 7+440W to 7+630W (lead—EB7+470W at 19 feet, EB7+471W at 9.5 feet, and EB7+600W at 10 and 14.5 feet; zinc—EB7+600W at 19 feet);
- Sta 7+500E to 7+600E (lead—EB7+550E at 25 feet);
- Sta 8+090W to 8+150W (lead and arsenic—EB8+145W at 20 feet);
- Sta 8+595E to 8+800E (pesticides—SEB8+700E at 20 feet);
- Sta 8+950E to 9+050E (pesticides—SEB9+000E at 20 feet);
- Sta 11+080 to 11+230E (pesticides—SB11+153E at 10.5 feet); and
- Sta 11+495E to 11+505E (pesticides—EB11+501E at 10.5 feet).

Total Maximum Daily Load for Mercury

In addition to the Kleinfelder report on hazardous materials, the SWRCB submitted a list of impaired water bodies in California to EPA in May 1998 as required by Section 303(d) of the CWA. The Guadalupe River was listed as not meeting current CWA water quality standards for mercury. Section 303(d) of the CWA also requires the SWRCB to prepare an evaluation of TMDL for state waters for the pollutants identified. On January 21, 2000, the SFBRWQCB released a public draft TMDL and implementation plan for mercury covering the entire San Francisco Bay. The draft TMDL identified the Guadalupe River system as a primary contributor of mercury to the bay estuary.

The TMDL program is designed to assess the sources of mercury and recommend management measures that will reduce the mercury contamination problems and restore water quality. A target of 0.4 mg/kg of mercury in sediments was established. Samplings indicated that mercury concentrations in sediments increased from the south bay to the mouth of the Guadalupe River to its headwaters. Average concentrations of mercury in the south bay were 0.45 mg/kg, and increased to 0.7 mg/kg at the mouth of the river and to 1.0 mg/kg in the river itself. By the SFBRWQCB's estimates, mercury load from the Guadalupe River to San Francisco Bay would need to be reduced by approximately 90% to meet the 0.4 mg/kg target. In summary, excavated soil having concentrations higher than 20 mg/kg should be disposed of in a class I landfill. Soil with mercury concentrations less than 20 mg/kg but greater than 1 mg/kg may be reused above the 3-year recurrence interval elevation, capped in place with clean soil, or disposed of at a landfill. Lastly, excavated soil with mercury concentrations equal to 1 mg/kg or less may be reused without restriction. For additional information, see the *Final General Re-Evaluation and Environmental Report for Proposed Project Modification for the Guadalupe River Project, Downtown San Jose, California* (Jones & Stokes 2001).

Most of the mercury in the Guadalupe River watershed is attached to sediments and particulates. The sediments that are of greatest concern for mercury contamination are those that were transported and deposited along the banks of the river during the gold rush, when mercury-bearing ore was mined in the upper watershed. Mercury concentrations in sediments from different areas of the Guadalupe River watershed can vary widely. The potential for adverse environmental effects from sediment-bound mercury in the watershed will depend primarily on the source, transport, and deposition characteristics and the physical and chemical properties of the sediment, as well as the solubility of mercury in the water column. A primary concern is the potential for mercury in the aquatic environment to transform to dissolved forms that can be absorbed by aquatic organisms, causing toxic reactions. (Jones & Stokes 2000.)

Methyl mercury can form in accumulated sediments by the process of methylation, which is dependent on environmental conditions such as pH, amount of dissolved organic carbon, temperature, the presence of sulfates, and light. Many of these environmental conditions are, in turn, affected by biological processes, such as growth, decay, and other metabolic processes; therefore, it is likely that the rate and quantity of methyl mercury formation change seasonally.

Controlling sediment in the river is crucial for compliance with the reduction of mercury levels recommended in the TMDL program. For more information, please see the "Water Quality" section of chapter 3.

Hazardous Materials

The following are the results by reach of a hazardous materials investigation conducted by Kleinfelder in 1999 and 2000.

Reach A

An environmental assessment of reach A indicated potential groundwater contamination from petroleum hydrocarbons. Borings were drilled to assess or confirm potentially contaminated soils that may affect the construction for ramps and/or walls along reach A. Nine borings (14+450W, 14+625E, 15+200W, 15+575W, 15+775W, 16+025W, 16+725W, 17+025W, and 17+350W) were taken on the inboard embankments to depths of 1.52 m (5.0 feet) below ground surface (bgs). Borings at 15+350W, 15+600W, 17+250W, and 17+550W were taken at the top of the inboard levee to depths of 6.1 m (20.0 feet) bgs. Mercury was the only chemical of concern found at various depths below the levee in this reach. Since floodwalls are proposed for this reach, soils will need to be sampled and analyzed before determining the appropriate disposal facility or reuse.

Reach B

No sites in reach B were identified as having a high probability of contamination in construction areas.

The following site was identified as having no contamination or contamination below the regulatory threshold.

- *Storm drain at Sta 14+040E.* The storm drain is located on the east levee, south of Trimble Road and adjacent to the Hewlett-Packard facility. The soil in the vicinity of the storm drain (Sta 14+036E) contains metals; however, Kleinfelder concluded that special handling of excavated soils most likely would not be required and that the soils could be disposed of at a landfill or reused for construction. The soil is not classified as a hazardous waste.

Access was denied and the presence of hazardous materials is unknown at the Hewlett-Packard facility (Sta 13+690E to 14+445E). This facility is located on the east bank of the river, immediately south of Trimble Road.

Reach C

No sites in reach C were identified as having a probability of contamination in construction areas.

The following sites were identified as having no contamination or contamination below regulatory thresholds.

- *City of San Jose property adjacent to the east bank of the river and immediately north of Trimble Road (Sta 13+410E to 13+650E).*
- *Kaiser Aerospace and Electronics, adjacent to the east bank of the river and north of Trimble Road (12+720E to 13+140E).*
- *Realtee Property II LP, adjacent to the east bank of the river and immediately north of Gibson G. D. and Kay Metals (Sta 12+060E to 12+120E).* Special handling of excavated soils probably would not be required; however, this analysis is based on only 1 borehole at the property. More soils should be tested to determine the extent of contaminants.
- *Renco Associates, adjacent to the east bank of the river, immediately north of Realtee Property, south of Montague Expressway (Sta 11+843E to 12+260E).* Special handling of excavated soils probably would not be required; however, this analysis is based on only 1 borehole at the property. More soils should be tested to determine the extent of contaminants.

Access was denied and the presence of hazardous materials is unknown at the following sites.

- *Goguen et al. (Sta 13+475W to 13+530W).* This property is adjacent to the west bank of the river on Laurelwood Avenue, just north of Trimble Road.
- *Renco Associates (Sta 12+240E to 12+720E).* This property is adjacent to the east bank of the river between the Kaiser and Gibson properties.

Reach D

The following hazardous materials sites in reach D have been identified as having high probability of soil and/or groundwater contamination.

- *URS Greiner Woodward Clyde Geotechnical Borings (11+501E).* This location is on the east bank of the river, just north of Montague Expressway at approximately the same location as the Santa Clara County

Transit District (SCCTD). Pesticides exist at 32.0 m (10.5 feet) below the top of the levee; however, construction to raise the levee is not expected to require excavation to that depth.

There is no contamination or contamination is below the regulatory threshold for the following site.

- *City of San Jose property adjacent to the east bank of the river south of the Hetch Hetchy Aqueduct and west of and adjacent to Wyse Technology Investments (Sta 10+700E to 11+000E).* Although mercury and lead were found at concentrations exceeding 10 times the STLC, analyses showed that these metals are not soluble. The soils at the property contain pesticides at concentrations below the regulatory threshold. There would be no substantial constraints affecting property acquisition or project construction at this site. The soil is not classified as a hazardous waste and does not require special handling for disposal.

Access was denied and hazardous materials are unknown at the following sites in reach D.

- *SCCTD (Sta 11+235E to 11+520E).* The property is adjacent to the east bank of the river, approximately 0.81 km (0.5 mile) north of Montague Expressway and immediately south of Wyse Technology Investments.
- *Knickerbocker Properties Incorporated (Sta 10+490E to 10+700E).* The property is adjacent to the east bank of the river, immediately south of the Hetch Hetchy Aqueduct. Part of the property extends north of the pipeline into reach E.

Reach E

The following hazardous materials site in reach E was identified as having a high probability of soil and/or groundwater contamination.

- *Property from Sta 9+275E to 10+050E.* Levee rehabilitation may require excavation below native soil or groundwater elevation. It is recommended that soil to be excavated be sampled and analyzed for pesticides and metals before deciding on disposal methods. If dewatering is required, groundwater may require treatment before disposal into the river. Soil and groundwater should be managed according to the final *Soil and Groundwater Management Plan* to be published by Kleinfelder.

The following site was identified as containing no contamination or contamination below the regulatory threshold.

- *KLA-Tencor Corporation, adjacent to the east bank of the river, between Knickerbocker Properties and SGA Development Partnership (Sta 10+110E to 10+490E).* There are no substantial constraints on project construction from soil contamination on this property. If this property were excavated, special handling of excavated soils probably would not be required. Soils could be disposed of at a landfill or reused for construction.

Reach F

No hazardous materials sites in reach F were identified as having a high probability of soil and/or groundwater contamination. The following sites were identified as having a probability of contamination, usually groundwater.

- *Property from Sta 8+200W to 8+600W.* Levee rehabilitation may require excavation below native soil or groundwater elevation. Soil to be excavated should be sampled and tested for pesticides and VOCs before deciding on disposal options. If dewatering is required, groundwater may require treatment before disposal into the river. Soil and groundwater should be managed according to the final *Soil and Groundwater Management Plan* to be published by Kleinfelder.

The following site has been identified as having either no contamination or contamination that is below the regulatory threshold.

- *Levee adjacent to Beaumont Investments Ltd., on the east bank of the river south of SR 237 (Sta 8+470E to 8+620E).* Kleinfelder concluded that there are no substantial constraints on project construction from contaminated soil. The soil is not classified as hazardous waste and no special requirements would be needed for handling soil disposal.

Access was denied and the presence of hazardous materials is unknown at the following sites; however, tests were performed on soils from the levees adjacent to the sites.

- *Gibson-Speno & A-M & Nel Associates (Sta 8+940E to 9+180E).* The property is adjacent to the east bank of the river, immediately north of Tasman Drive. Borings were done at the top of the inboard levee to 7.6 m (25 feet) and at the inboard toe to 3.1 m (10 feet). Additional sampling of both soil and groundwater should be done to verify the depth to groundwater and better delineate potential impacts.
- *Renaissance Associates (Sta 8+610E to 8+940E).* The property is adjacent to the east bank of the river between Beaumont Investments Ltd.

and Gibson-Speno & A-M & Nel Associates. Borings were done at the top of the inboard levee to a depth of 7.6 m (25 feet) bgs and at the inboard toe to 3.1 m (10 feet) bgs. Pesticides were found in the soil at the outboard toe. If excavated, soil would require special handling. Further investigation is suggested to verify and delineate the extent of pesticide contamination.

Reach G

The following hazardous materials site in reach G is identified as having a high probability of soil and/or groundwater contamination.

- *District property adjacent to the east bank of the river near Gold Street in Alviso (Sta 7+008E to 7+108E).* Asbestos has affected the soil that underlies the Sainte Claire property. If this property were to be excavated, special handling would probably be required for soil disposal and worker protection. Kleinfelder recommends further soil assessment to confirm and delineate the presence of asbestos. Because of the nonhomogeneous nature of the landfills and the potential for encountering unknown and unexpected material, it is recommended that construction plans be designed to minimize soil disturbance in this area.

  The existence of VOC-contaminated groundwater could affect construction if the levee is excavated to groundwater elevation. The District should be prepared for dewatering of the reach and treatment of groundwater before discharge into the river.

The following site in reach G is identified as having a probability of contamination, usually groundwater.

- *Felton-Norborn property, adjacent to the west bank of the river at 2100 Gold Street in Alviso (Sta 7+040W to 7+110W and 7+122E to 7+210E).* If this property were to be excavated, special requirements probably would not be needed for handling excavated soil; soils could be disposed of at a landfill or reused for construction. Because of the presence of VOCs above regulatory limits in the groundwater, soils excavated from beneath the water table or groundwater removed during dewatering operations would need to be separated and tested to consider options for disposal.

The following site in reach G is identified as having no contamination, or contamination below the regulatory threshold:

- *State of California property on the west bank of the river, adjacent to the Sommerset Mobile Home Park on Gold Street (approximately Sta7+155W to 7+250W)*. The soil that underlies the property contains pesticides at a concentration below the regulatory threshold. Kleinfelder concluded that there are no substantial constraints on project construction from contaminated soil.

Access was denied and the presence of hazardous material is unknown at the following sites; however, tests were performed on soils from the levees adjacent to the State of California site.

- *Sainte Claire Corporation (7+460E to 7+990E)*. This property is adjacent to the east bank of the river between Gold Street and SR 237.
- *State of California property (Sta 7+820E to 8+015E)*. This property is adjacent to the east bank of the river, immediately north of SR 237. Borings were drilled to approximately 16–20 m (52.5–65.6 feet) east of the top of the levee and under the northern span of SR 237. It would not be likely that construction would be affected by contaminated soils in this area and the affected groundwater would most likely be below the level of excavation.
- *Santos property (Sta 7+210E to 7+520E)*. This property is adjacent to the east bank of the river between Gold Street and SR 237.

Methods and Significance Criteria

Analyses of the impacts of hazards and hazardous materials on construction and vegetation and sediment management are based on the results of investigative activities and evaluations done by Kleinfelder (2000) in accordance with generally accepted standards of care that existed in California at the time the work was performed (i.e., 1999 and 2000). The conclusions and recommendations are based on the following investigative activities:

- drilling of 139 borings in phase I (September–October 1999) and 61 borings in phase II (September–October 2000);
- quantitative chemical analysis of approximately 475 soil and 42 groundwater samples by Clayton Environmental Consultants and Sequoia Analytical (phase I) and Chromalab (phase II);
- geophysical surveys completed by Cruz Brothers, Inc.;

- records review update, including regulatory agency communications and file reviews, and site database surveys provided by Vista Information Systems, Inc.; and
- field observations (Kleinfelder 2000).

The following criteria were used to determine the significance of effects related to hazards and hazardous materials. These criteria are based on the State CEQA Guidelines and CEQ's NEPA regulations. The LGRP would have a significant effect if it would

- create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials;
- create a significant hazard to the public or the environment through reasonable foreseeable upset or accident conditions involving the release of hazardous materials into the environment;
- impair implementation of an emergency response plan; or
- expose the public, workers, or the environment to hazardous materials.

The impact analysis below assumes a 17,000 cfs floodflow. Potential impacts associated with the additional 1,350 cfs of interior drainage entering the Guadalupe River are addressed in chapter 4, "Cumulative Impacts."

Alternative 1: No Project

Under the No-Project Alternative, the Proposed Project would not be completed. No construction activities would be affected by known hazardous materials in soils or groundwater; however, remediation should be considered for soil and groundwater cleanup. Current maintenance practices would continue along with the District standard of testing soil to determine whether contaminated soils are present and special handling or disposal is necessary.

Alternative 2: Floodwalls/Levee Raise (Proposed Project)

Impact: Construction Activities Affected by Exposure to Contaminated Soils

Under the Proposed Project, construction activities, including excavation, could be affected by the presence of metals and pesticides in the excavated soils. In addition, more excavation and soil removal would be necessary to either replace the eastbound SR 237 bridge or to construct the bypass culvert under SR 237. The impacts of hazardous materials on construction activities are considered less than significant because precautions for proper handling and disposal of contaminated soils and groundwater would be built into the project design in accordance with regulatory standards. No mitigation is required beyond measures that have been incorporated into the project as environmental commitments.

The following has been incorporated into the project design.

- **Soil Management Plan.** The soil management plan includes protocols for classifying the content of wastes in soil. These protocols are based on standard analytical tests used for the disposal of material at appropriately licensed disposal sites.
  - The soil management plan has been updated to reflect the final project design and to incorporate input from the SFBRWQCB regarding management of soils containing elevated mercury concentrations (Kleinfelder 2001b).
  - Additional restrictions on soil management are included in the soil management plan submitted to SFBRWQCB for its approval (Kleinfelder 2001b).
- **Hazardous and Toxic Materials Contingency Plan.** Disposal of material excavated from all hazardous, toxic, and radioactive waste (HTRW) sites discovered within the project limits of the LGRP will require special consideration. The District will develop a contingency plan outlining a course of action in the event that previously unidentified HTRW sites are uncovered during construction.

For a complete description of the environmental commitments, see chapter 2, "Project Description."

Impact: Construction Activities Affected by Contaminated Groundwater

Under the Proposed Project, construction activities, including excavation, could expose construction personnel to contaminated groundwater. In addition, more excavation and soil removal would be necessary to either replace the SR 237 eastbound bridge or construct a new bypass culvert under SR 237. The impacts of hazardous materials on construction activities are considered less than significant because precautions for proper handling and disposal of contaminated soils and groundwater would be built into the project design in accordance with regulatory standards. No mitigation is required beyond measures that have been incorporated into the project as environmental commitments.

Alternative 3: Channel Bank Modification

Impact: Construction Activities Affected by Exposure to Contaminated Soils

Under the Channel Bank Modification Alternative, construction activities, including excavation, could be affected by the presence of metals and pesticides in the excavated soils. This impact is considered less than significant because protective measures for handling and disposing of contaminated soils would be built into the project design in accordance with regulatory standards. No mitigation is required.

Impact: Construction Activities Affected by Exposure to Contaminated Groundwater

Under the Channel Bank Modification Alternative, construction activities, including excavation, could expose construction personnel to contaminated groundwater. This impact is considered less than significant because protective measures for the proper handling and decontamination of groundwater would be built into the project design in accordance with regulatory standards.

Alternative 4: Channel Bypass

Under the Channel Bypass Alternative, potential impacts of hazardous materials on construction activities related to exposure to contaminated soil or groundwater would be greater than described for the Proposed Project because construction of the bypass culverts would entail excavating both the east- and west-bank levees to site box culverts. This construction activity could potentially result in exposure of construction workers to known or unknown soil and groundwater impacts. Measures similar to those proposed for the Proposed Project would be required to reduce this potential hazard to acceptable levels.

Baylands Mitigation Measure

No hazardous materials investigations were conducted in the Alviso baylands area; however, it must be presumed that mercury and other hazardous materials are present in area sediment and that excavation and construction of structures associated with this measure could expose workers to contamination. To reduce the possibility of exposure to hazardous materials, the environmental commitments built into the Proposed Project will be implemented at the inflow weir site and levee sites. No further mitigation is required.

Vegetation

This section describes the existing plant communities and special-status plants that are found or may be found in the LGRP area. The area for the evaluation of vegetation includes reaches A–G and the potential staging and storage areas located outside the limits of LGRP construction. The study area is considered to be the footprint of the Proposed Project and consists of the lower Guadalupe River, the adjacent riverbanks and floodplains, the inboard levee banks, the outboard levee banks to the existing ROW boundaries, and the potential staging and storage areas (figure 2-1). Table 3-13 summarizes the acreage of the existing habitat types by reach of the lower Guadalupe River.

Terrestrial Vegetation Mapping

In September 1997, Jones & Stokes mapped terrestrial and aquatic habitats in the lower Guadalupe River channel and adjacent upland areas in reaches A–G as part of the fish sampling and water quality monitoring project for the lower Guadalupe River (Jones & Stokes Associates 1997). The results of the vegetation mapping surveys were not published as part of the fish sampling and water quality monitoring report. At the time of the 1997 surveys, the limit of terrestrial habitat mapping was the top of the levees on the outboard side.

In January 2001, Jones & Stokes mapped terrestrial and aquatic habitats on the outboard side of the levee in reaches B–G. Potential staging areas were also mapped and surveyed to determine vegetative cover types. No additional mapping was performed in reach A because no modifications to the location of LGRP features were identified in this reach. Wetland delineations were not performed as part of this mapping effort.

The amount and location of the existing habitats mapped in 1997 on the inboard side of the levee are based on aerial photographs taken in January 1996 (reaches E–G) and February 1996 (reaches A–D). The amount and location of the existing habitats mapped in 2001 on the outboard side of the levee are based on aerial photographs taken in August 1999.

Mapped habitat polygons were digitized into a geographic information systems (GIS) database, which was used to determine existing and affected habitat acreages. Habitat mapping is presented at the end of this EIR in appendix G.

The following 5 terrestrial vegetation cover types were identified and mapped during the 1997 and 2001 surveys:

- riparian forest,
- riparian scrub,
- ruderal herbaceous,
- ruderal scrub, and
- ornamental vegetation.

In addition to these vegetation cover types, SRA habitat was mapped during the 1997 surveys. Both overhead and instream SRA cover components were mapped.

Evaluation of Habitat Quality

In March 2000, Jones & Stokes (2000a) performed an assessment of habitat values and potential sediment removal areas in the project area. This draft assessment was revised in January 2002 following review of the methodology identified in the draft document. The original assessment was performed for reaches B–G to aid in the analysis of the environmental effects of the project alternatives by identifying high- and low-value habitats in the project area. Reach A was not included as part of the project at the time of the original assessment.

The specific criteria used to determine habitat value were

- patch size,
- proximity of patch to similar habitats and/or high-quality habitat,
- percent vegetative cover of wetlands and ruderal habitats,
- percent canopy cover of riparian habitat,
- canopy layering,
- quality of SRA cover habitat, and
- percent cover by native species and/or by species with a high habitat value to wildlife.

Like habitats were combined in the assessment to facilitate analysis. For example, riparian forest and scrub habitat were combined into riparian habitat. The 3 habitats evaluated included riparian, wetland, and ruderal. The determination of habitat value varied by habitat type, and not all criteria

Table 3-13. Summary of Existing Habitats in the Lower Guadalupe River Project Area

	Habitat Acreage by Project Reach							
	A	B	C	D	E	F	G	
Habitat Type	I-880 to U.S. 101	U.S. 101 to Trimble Road	Trimble Road to Montague Expressway	Montague Expressway to Hetch Hetchy Aqueduct Crossing	Hetch Hetchy Aqueduct Crossing to Tasman Road	Tasman Drive to SR 237	SR 237 to Union Pacific Railroad Bridge Crossing	Total
Terrestrial Habitat								
Riparian forest	4.23	1.12	12.57	2.22	0.09	0.04	0.02	20.29
Riparian scrub	0.40	0.06	3.43	1.02	0.00	0.00	0.00	4.91
Ruderal scrub	4.84	1.56	2.07	0.24	0.44	1.28	0.17	10.60
Ruderal herbaceous	17.91	9.31	19.56	19.18	8.78	11.27	6.97	92.98
Ornamental landscaping	1.71	0.05	0.54	0.33	0.07	0.86	0.07	3.63
Aquatic Habitats								
Wetland	5.87	1.95	7.00	6.96	11.39	17.34	17.71	68.22
Other waters of the United States	5.84	0.00	0.00	0.00	0.00	0.00	0.00	5.84
Open water	6.84	2.86	5.88	3.31	1.47	3.30	4.59	28.25
	Feet of SRA Overhead Vegetation by Project Reach							
SRA overhead vegetation	561	386	9,127	1,110	0	0	0	11,184

were used to assess each habitat. Table 3-14 summarizes the total acreage of each habitat based on habitat value.

Habitat Evaluation Definitions

Habitat values for the LGRP area were assigned as described below.

Riparian Habitat

Riparian habitat was typically assigned a habitat value based on patch size, proximity to similar habitats, canopy structure, and quality of SRA cover habitat. Riparian habitat values were defined as follows:

- **Low-Quality Riparian Habitat:** Isolated mature trees or a small cluster of trees with an herbaceous or limited herbaceous understory~~,~~; ~~or~~ small, isolated clusters of riparian scrub with an herbaceous or limited herbaceous understory~~.~~; or small clusters of trees and shrubs consisting of native and nonnative riparian species (e.g., black walnut).
- **Moderate-Quality Riparian Habitat:** Mature trees or small clusters of trees in the vicinity of other riparian vegetation or wetland habitats of similar or greater value, mature trees or small clusters of trees that have a low to moderate amount of canopy diversity, or small, isolated patches of riparian scrub in the vicinity of other riparian vegetation or wetland habitats of similar or greater value; small clusters of trees or shrubs consisting of native and nonnative species or portions of an existing high-quality riparian habitat dominated by nonnative species; or riparian vegetation that provides a low to moderate amount of overhead instream SRA cover value.
- **High-Quality Riparian Habitat:** Large multistory stands of mature trees and/or riparian shrubs, or small clusters of trees and shrubs consisting of primarily native species in the vicinity of other riparian vegetation or wetland habitats that have the same value; or large stands of trees or shrubs that provide overhead and/or instream SRA cover value.

Wetland Habitat

Wetland habitat was typically assigned a habitat value based on patch size, proximity to similar habitats, percent vegetative cover, and percent cover by vegetation with a high value to wildlife. Wetland habitat values were defined as follows:

- **Low-Quality Wetland Habitat:** Small isolated patches or relatively short, narrow linear bands of vegetation; larger patches or linear bands of wetland habitat that have a relatively low percentage of vegetative cover by wetland vegetation, particularly wetland vegetation with high habitat value to wildlife or wetlands that have good vegetative cover but are not located near other high-quality habitats (e.g., wetlands, riparian).

- **Moderate-Quality Wetland Habitat:** Moderate-size patches or relatively narrow linear bands of vegetation in the vicinity of other habitats (e.g., wetlands, riparian) of similar or greater value or large patches or linear bands of wetland habitat that have a relatively moderate percentage of vegetative cover by wetland vegetation, particularly wetland vegetation with high habitat value to wildlife.
- **High-Quality Wetland Habitat:** Large patches of wetland vegetation that provide vegetative cover over all or most of the patch area or patches or linear bands of wetland vegetation with a high percentage of vegetation that provide a high habitat value to wildlife that is in the vicinity of other habitats (e.g., riparian) of similar or greater value.

Ruderal Habitat

Ruderal habitat was typically assigned a habitat value based on canopy layering and the percent cover by species with a high habitat value to wildlife. Ruderal habitat values were defined as follows:

- **Low-Quality Ruderal Habitat:** All patches identified as ruderal herbaceous and isolated patches of ruderal scrub vegetation.
- **Moderate-Quality Ruderal Habitat:** This designation was not used in the assessment of habitat value.
- **High-Quality Ruderal Habitat:** Habitat with complex canopy structure and close proximity to high-quality habitats. Some patches identified as ruderal scrub that are adjacent to high-quality riparian and/or wetland habitat.

The overall habitat value for each of the project reaches is summarized below.

Reach A

At the time of the March 2000 habitat quality assessment, reach A was not included as part of the project area. The following habitat quality description is based on observations during vegetation mapping in September 1997, on subsequent site visits, and on interpretation of aerial photographs. Much of the riparian and ruderal habitat, as well as a portion of the wetland habitat, in this reach has a ~~low- to~~ moderate- to low-quality habitat value. The riparian habitat in this reach typically consists of isolated mature trees or small clusters of trees with an herbaceous understory. Much

Table 3-14. Summary of Total Acres of Each Habitat Based on Habitat Value

	Riparian				Wetland				Ruderal			
Project Reach	Low Quality (a)	Moderate Quality (a)	High Quality (a)	Habitat Quality Not Identified (b)	Low Quality (a)	Moderate Quality (a)	High Quality (a)	Habitat Quality Not Identified (b)	Low Quality (a)	Moderate Quality (a)	High Quality (a)	Habitat Quality Not Identified (b)
A	NA	NA	NA	4.63	NA	NA	NA	5.87	NA	NA	NA	22.75
B	1.18	–	–	–	0.20	1.75	–	–	7.73	–	–	3.14
C	0.17	0.29	16.72	–	0.38	0.02	6.58	0.02	15.66	–	1.18	4.79
D	0.11	0.93	2.11	0.09	1.39	0.27	5.30	–	15.55	–	–	3.87
E	–	0.06	–	0.03	1.61	7.58	2.21	–	5.82	–	–	3.40
F	–	–	–	0.04	–	0.06	16.81	0.47	5.70	–	–	6.85
G	–	–	0.02	–	–	–	16.50	1.21	3.29	–	–	3.85

Notes:
(a) Source: CH2M Hill 2000b.
(b) Habitat quality was not identified during the June 2000 analysis (CH2M Hill 2000b).

of the riparian habitat is located away from the river channel and provides minimal or isolated patches of SRA cover. The SRA cover mitigation sites that have been installed as part of the Downtown Guadalupe River Project are expected to increase the overall habitat value of reach A (between Airport Parkway and I-880) as they mature. The ruderal habitat consists of isolated shrubs or small clusters of shrubs and relatively large areas of herbaceous vegetation. Wetland habitats in reach A have a low- to moderate-quality habitat value because they consist primarily of small isolated patches and relatively small, narrow linear bands of vegetation adjacent to ruderal habitats and sparse riparian vegetation.

Reach B

All the riparian and ruderal habitat, as well as a portion of the wetland habitat, in this reach received a low-quality habitat value. The riparian habitat in this reach typically consists of isolated mature trees or small clusters of trees with an herbaceous understory. The ruderal habitat consists of isolated shrubs or small clusters of shrubs and relatively large areas of herbaceous vegetation. Wetland habitats were determined to have a low- to moderate-quality habitat value because they consist primarily of small isolated patches or relatively short and narrow linear bands of vegetation adjacent to ruderal habitats or sparse riparian vegetation.

Reach C

In this reach, the banks of the lower Guadalupe River are lined with high-quality riparian habitat, which provides high-quality SRA cover. The riparian vegetation in this reach consists primarily of native vegetation. The banks of the low-flow channel are dominated by cottonwood, willow, and box elder. The dominant riparian vegetation on the west side of reach C, along the levee and adjacent to the toe of the levee, include black walnut, elderberry, and scattered willows. The dominant riparian vegetation on the east side of reach C, adjacent to the bypass channel, includes cottonwood and willows. Ruderal scrub vegetation (i.e., coyote brush [*Baccharis pilularis*]), Himalayan blackberry [*Rubus discolor*]) adjacent to the riparian corridor also received a high-quality habitat value because this ruderal vegetation serves to further enhance the riparian vegetation by adding to the overall canopy coverage and canopy structure. This structure provides a diversity of habitats in the channel in which birds and mammals can forage and take refuge during high flows.

Wetland vegetation in this reach is located primarily within the bypass channel on the east side of the river. The majority of the wetland vegetation received a moderate- to high-quality habitat value, depending on the type of vegetation and percent cover of vegetation. For the most part, wetlands in this reach consisted of relatively large patches adjacent to other high-quality wetland habitat, as well as to high-quality riparian habitat.

Reach D

The habitat value of riparian and wetland habitat patches varied within this reach, depending on the size of the individual patches and their proximity to other patches. Riparian habitat in this reach received a moderate- to high-quality habitat value. Although riparian habitat in this reach consists of relatively small- to moderate-size patches of vegetation, it is adjacent to other riparian and wetland habitat patches and provides SRA cover value. All ruderal habitats received a low-quality habitat value because they consisted primarily of ruderal herbaceous vegetation with isolated shrubs or small shrub clusters.

Reach E

This reach consists primarily of wetland and ruderal habitats. The habitat value of wetland habitat patches varied within this reach. All ruderal habitats received a low-quality habitat value because they consisted primarily of ruderal herbaceous vegetation with isolated shrubs or small shrub clusters.

Reaches F and G

Reaches F and G consist of wetland and ruderal habitats. All wetland habitat in these reaches received a high-quality habitat value based on the large sizes of the individual patches, the high percentage of vegetative cover provided by species with a high habitat value to wildlife, and the high percentage of cover vegetation within individual patches. All ruderal habitats received a low-quality habitat value for the same reasons identified for reach E.

Wetland Delineation

Jurisdictional wetlands and other waters of the United States within the LGRP area were identified in 3 separate wetland delineations. In November 1997, H. T. Harvey & Associates conducted a CWA Section 404 jurisdictional wetland delineation that mapped wetlands and other waters of the United States on both the inboard and outboard sides of the levees in reaches B–G (H. T. Harvey & Associates 1998). Reach A, which was not part of the LGRP area at the time of the 1997 delineation, was delineated in

2000 as part of 2 separate projects. In April 2000, Jones & Stokes conducted a delineation of jurisdictional wetlands in the upper portion of reach A, between I-880 and Airport Parkway, as part of the Guadalupe River Project in downtown San Jose (Jones & Stokes 2001). In summer 2000, H. T. Harvey & Associates conducted a wetland delineation in the lower portion of reach A, between Airport Parkway and U.S. 101, as part of the LGRP.

Because the 1997 mapping of terrestrial and aquatic habitat performed by Jones & Stokes did not include a delineation of jurisdictional wetlands, the 1997 H. T. Harvey & Associates wetland delineation data set (H. T. Harvey and Associates 1998) and the 1997 Jones & Stokes data sets of terrestrial and aquatic habitat (Jones & Stokes Associates 1997) were combined in 1999. Inconsistencies between the data sets with regard to jurisdictional wetland habitats were resolved through field verification. Delineated wetlands took precedence over nondelineated wetland cover polygons mapped by Jones & Stokes.

The following 4 types of waters of the United States were identified and mapped during the 1997 and 2000 surveys:

- nontidal freshwater marsh,
- tidal freshwater marsh,
- seasonal wetland, and
- other waters of the United States.

Terrestrial and aquatic habitat types and locations are described in the following sections.

Riparian Vegetation

Riparian vegetation in the LGRP area consists of riparian forest and riparian scrub. The overhead component of the existing SRA habitat was mapped separately from the overall riparian canopy cover. Existing riparian forest and scrub and SRA overhead cover habitats are described below.

During the 1999 and 2001 mapping surveys of terrestrial habitat, native and nonnative riparian vegetation was mapped as either riparian forest or scrub, regardless of its location relative to the river channel, elevation above the water surface, frequency and duration of inundation, and species composition. During the subsequent impact analysis, ~~"mesic" (i.e., moderately moist) and "xeric" (i.e., containing little moisture) riparian vegetation zones were identified~~ the definition of the habitat quality parameters was refined to more accurately reflect existing site conditions and to provide a tool for determining mitigation ratios for affected riparian habitat.

Existing riparian habitat may consist of 1 of the following:

- riparian species that require less mesic soil conditions for germination and establishment (e.g., black walnut, blue elderberry)~~,~~; or
- those that require more mesic soil conditions for germination and establishment, provide a wide, dense canopy, and provide nesting and roosting habitat for raptors (e.g., cottonwoods, willows, and box elder [all of which have a facultative wetland indicator status]).

Although the species that require less mesic conditions ~~are considered to be~~ provide riparian ~~species~~ habitat, they favor less mesic soil conditions, do not have a wetland indicator status (Reed 1988), and are found in areas with little to no connection to the groundwater table. In the LGRP area, less mesic riparian species are generally located farther from the lower Guadalupe River's low-flow channel than other riparian species that require more mesic conditions for successful natural establishment.

In some cases, a xeric riparian zone may be dominated by mesic riparian species (i.e., some of the existing riparian habitat is located well above the summer water surface elevation in locations that may be inundated only during extremely high flow events). Examples of this condition occur in reach A, where many of the existing cottonwood trees are found at or near the top of the levee, in locations where they would not be expected to germinate and become established under present-day hydrologic conditions. These trees most likely became established when the river was subject to a different hydrologic regime or may have become established as a result of historical agricultural or irrigation practices.

The xeric riparian vegetation zones typically consist of individual trees or small clusters of trees that have an understory of upland ruderal scrub or herbaceous species. These areas are also found on the outer edge of the riparian habitat areas (e.g., west levee in reach C). In reach C, most of the riparian habitat occurs as a continuous corridor along the river. On the west side of reach C, on and adjacent to the levee, the riparian vegetation is encroaching on the inboard side of the levee. This area consists of more xeric and compacted soils than are found along the river. The dominant species include black walnut and elderberry and some willows have encroached onto the levee.

By contrast, mesic riparian vegetation zones consist of individual trees, small clusters of trees, and large patches of riparian vegetation with an understory of riparian shrub species, seedlings of riparian species, and ruderal or wetland herbaceous vegetation.

For the purpose of this analysis, ~~xeric~~ most of the riparian habitat located on the LGRP levees was considered to be ~~any riparian vegetation located on the LGRP levees~~ of low or moderate quality. This designation is justified because ~~all the trees identified as xeric are located well above the groundwater table and have little connection to groundwater~~ the species composition includes nonnative and native species, and trees and shrubs are of relatively small stature and provide less canopy area. They are also located relatively large distances from the channel bottom, are inundated infrequently (only during extreme high-flow events), and have ~~an~~ a sparse or ruderal herbaceous understory ~~typical of xeric riparian habitat~~.

Riparian Forest

Riparian forest vegetation in the LGRP area is composed of native and nonnative trees and shrubs more than approximately 4.6 m (15 feet) high. Riparian vegetation less than 4.6 m (15 feet) high was mapped as riparian scrub and is discussed below.

Except for its location near the coast, riparian habitat in the LGRP area resembles that classified as great valley riparian forest (Holland 1986). There are 8.21 hectares (20.3 acres) of riparian forest vegetation in reaches A–F (table 3-13). Riparian forest is most dense and most common upstream in reach C. It occurs in relatively small to moderate, isolated patches in reaches A, B, D, E, and F. There is no riparian forest in reach G.

The location of riparian vegetation in the LGRP area varies within each reach. All the riparian forest in the LGRP area, with the exception of a small isolated cluster in reach F on the outboard side of the levee, is located on the inboard side of the levees. In reach A, the riparian vegetation is located primarily on the middle to upper portion of the riverbanks, away from the river channel. In reaches B, D, and E, riparian vegetation is primarily located on bar formations or on low terraces adjacent to the low-flow channel. Riparian vegetation in reaches A, B, D, and E provide relatively small to moderate areas of overhead SRA habitat.

In reach C, the banks of the lower Guadalupe River are lined with riparian vegetation that provides nearly continuous SRA cover along most of the reach. There are 5.09 hectares (12.57 acres) of riparian forest in reach C.

Of this total, approximately 0.30 hectare (0.73 acre) are associated with the District's Montague Expressway to Trimble Road Riparian Mitigation Project on the west side of the overflow channel. This mitigation project, which totals approximately 1.62 hectares (4 acres), was implemented in winter 1992–1993 to mitigate impacts associated with the District's flood-control projects from the UPRR bridge to U.S. 101 (Santa Clara Valley Water District 1982, H. T. Harvey & Associates 1992).

Riparian forest has a tall overstory of deciduous broadleaf trees, primarily Fremont cottonwood (*Populus fremontii*), arroyo willow (*Salix lasiolepis*), and red willow (*Salix laevigata*). Other native riparian forest species include box elder (*Acer negundo*)~~,~~ and blue elderberry (*Sambucus mexicana*)~~, and California black walnut (*Juglans hindsii*)~~. Nonnative riparian forest species that contribute to the riparian forest overstory include California black walnut (*Juglans hindsii*), elm (*Ulmus* sp.), black locust (*Robinia pseudoacacia*), and weeping willow (*Salix babylonica*). In some locations there is a dense understory of riparian tree and shrub seedlings and saplings, including Himalaya blackberry (*Rubus discolor*) and herbaceous species. In addition, in some locations, the riparian forest vegetation includes individual trees or small clusters of trees that typically have an understory dominated by ruderal herbaceous vegetation.

Herbaceous species vary by location depending on soil conditions and the density of the riparian canopy. Some of the dominant herbaceous understory species include ripgut brome (*Bromus diandrus*), Bermudagrass (*Cynodon dactylon*), smilo grass (*Oryopsis miliacea*), white sweet-clover (*Melilotus alba*), and cocklebur (*Xanthium strumarium*).

Riparian forest is found on the lower banks and bar formations, midbanks, and upper banks of rivers and streams. Several factors influence the presence of riparian forest, including

- water availability,
- frequency of floods or inundation when seeds are dispersed, and
- past flood-control and channel maintenance activities.

Riparian forest provides most of the overwater vegetation component of SRA cover, consisting of overhead vegetative cover and instream woody cover. *SRA overhead cover* is defined as the nearshore riparian vegetation located near the interface between the river and the adjacent riparian vegetation habitat.

Riparian Scrub

Riparian scrub in the LGRP area is composed of native and nonnative tree, shrub, and vine species less than approximately 4.6 m (15 feet) high that are not under the canopy of riparian forest trees. Riparian scrub is found on the lower banks adjacent to the river or along the flood-control bypass channels. All the riparian scrub habitat in the LGRP area is located on the inboard sides of the levees. Most riparian scrub habitat is expected to mature into riparian forest as tree saplings grow; therefore, riparian scrub habitat can be considered (although it is classified as Central Coast riparian scrub) as an early successional stage of great valley riparian forest (Holland 1986). There are approximately 2 hectares (4.9 acres) of riparian scrub vegetation in the LGRP area (table 3-13).

All the riparian scrub habitat is found in reaches A–D. There is no riparian scrub vegetation in reaches E–G. There are relatively small to moderate, isolated patches of riparian scrub in reaches A, B, and D.

Riparian scrub is most dense and most common in reach C, where large areas are located on the west side of the bypass channel (table 3-13). There are 1.39 hectares (3.43 acres) of riparian scrub in reach C. Of this total, approximately 0.79 hectare (1.96 acres) are associated with the District's Montague Expressway to Trimble Road Riparian Mitigation Project on the west side of the bypass channel.

Riparian scrub vegetation includes deciduous broadleaf trees and shrubs similar to those identified in riparian forest habitats. The dominant species include Fremont cottonwood, red willow, arroyo willow, and sandbar willow.

Shaded Riverine Aquatic Habitat

SRA cover vegetation is the nearshore aquatic and overhead vegetative cover that grows at the interface between a river and adjacent riparian habitat. Important features of this aquatic cover include

- an adjacent bank composed of natural substrate that is often eroding and that supports overhanging riparian vegetation and vegetation that may protrude into the water, and
- a channel with variable amounts of instream woody material, rocky substrate, and detritus, and variable water velocity and depth.

SRA cover vegetation has 2 components: overhead cover and instream cover. Overhead SRA cover consists of riparian vegetation that overhangs the channel and provides important shading. Overhead SRA cover also contributes leaf litter, woody material, and insects to the channel. Instream SRA cover consists of submerged woody debris (exposed roots, branches, and trunks), aquatic plants, gravel, cobble, and boulder substrates, and undercut banks.

The area of SRA overhead cover vegetation is determined by measuring the canopy area of SRA cover vegetation that covers the channel. The length of SRA cover vegetation is measured from the points at which the upstream and downstream limits of the riparian canopy intercept the summer shoreline (during the summer of years of average precipitation and runoff). In portions of the LGRP area, SRA overhead cover extends across the entire river.

There are 3,409 m (11,184 feet) of SRA cover vegetation within the LGRP area (table 3-13). Reach C, where the banks of the lower Guadalupe River are nearly continuously lined with riparian vegetation, contains approximately 86% of the existing SRA cover in the LGRP area. SRA cover is provided by a number of native and some nonnative riparian species, including cottonwood, willows, and box elder.

Wetlands and Other Waters of the United States

Jurisdictional Wetlands

Jurisdictional wetlands are found in areas of permanently or seasonally saturated soil or standing water throughout the LGRP area. Wetlands are located primarily within and adjacent to the river channel and in isolated areas on the overbank areas and the bypass channel between Montague Expressway and Trimble Road. There are approximately 27.61 hectares (68.22 acres) of wetlands in the LGRP area (table 3-13). Wetlands are the dominant cover type in reaches E–G and are abundant in reach D. Jurisdictional wetland delineations were performed for the LGRP area. These delineations and the study area for each delineation were

- reaches B–G (H. T. Harvey & Associates 1998);
- reach A between Airport Parkway and U.S. 101 (H. T. Harvey & Associates 2001); and
- reach A between I-880 and Airport Parkway (Jones & Stokes 2001).

The dominant wetland species found in the LGRP area vary from reach A to reach G with salt-intolerant species, such as narrow-leaved cattail, in upstream reaches to salt-tolerant species, such as alkali bulrush occurring in downstream reaches. The existing interface between the tidally influenced freshwater marsh and the nontidally influenced freshwater marsh is located at approximately Montague Expressway. Within reaches D–G, both salt-tolerant and salt-intolerant species are present. Although the freshwater marsh in reaches D–G are tidally influenced, soil salinity appears to be within the acceptable range of freshwater marsh vegetation, based on the presence of salt-intolerant species in these areas. The interface between brackish marsh and freshwater marsh appears to be in the vicinity of the Alviso Marina.

For the purpose of this analysis, perennial wetlands located downstream of Montague Expressway are classified as tidal freshwater marsh, whereas perennial wetlands located upstream of Montague Expressway are classified as nontidal freshwater marsh. Although the impact assessment identifies the impacts for both habitat types, the mitigation requirement is the same for both tidal and nontidal freshwater marsh.

The dominant wetland species found in nontidal freshwater marsh are

- narrow-leaved cattail (*Typha angustifolia*),
- rice cutgrass (*Leersia oryzoides*),
- bur-reed (*Sparganium eurycarpum*),
- alkali bulrush (*Scirpus robustus*), and
- perennial peppergrass (*Lepidium latifolium*).

The dominant species found in tidal freshwater marsh are

- alkali bulrush (*Scirpus robustus*),
- California bulrush (*Scirpus californicus*),
- perennial peppergrass (*Lepidium latifolium*), and
- gum plant (*Grindelia* ssp.).

The dominant species found in locations that are typically seasonally inundated or saturated are

- California aster (*Aster chilensis*),
- white sweet clover,
- narrow-leaved cattail,
- cocklebur,

- nutsedge (*Cyperus* sp.), and
- rice cutgrass.

Other Waters of the United States

Other waters of the United States include open-water channels and barren gravel bars below the ordinary high-water mark. Open water is found in all 7 reaches and includes the lower Guadalupe River channel, backwater areas, and small depressions within the bypass channel in reach C. Gravel bars are found in reach A above Airport Parkway. There are approximately 13.8 hectares (34.1 acres) of other waters of the United States in the LGRP area (table 3-13). Other waters of the United States were identified during the wetland delineations identified above.

Ruderal Vegetation

Ruderal vegetation in the LGRP area is upland habitat that is classified as ruderal scrub or ruderal herbaceous habitat. The ruderal herbaceous habitat is the dominant cover type in the LGRP area. Ruderal habitats were classified using a modified system based on Holland's habitat classification system (Holland 1986). A description of existing ruderal scrub and herbaceous vegetation is provided below.

Ruderal Scrub

Ruderal scrub in the LGRP area is upland habitat composed of native and nonnative shrub and vine species. The dominant shrub and vine species include coyote brush (*Baccharis pilularis*), blue elderberry, and Himalaya blackberry. There are approximately 4.3 hectares (10.6 acres) of ruderal scrub vegetation in small patches throughout the LGRP area (table 3-13). Ruderal herbaceous vegetation is typically found beneath the ruderal scrub vegetation.

Ruderal scrub habitat is found in all LGRP reaches and is located on both the inboard and outboard sides of the levees. Ruderal scrub is most dense and common in reaches A and C, where there are relatively large areas of ruderal scrub habitat on the riverbanks and levees. Ruderal scrub is found in relatively small to moderate, isolated patches in reaches B, D, E, and G. There are large, linear patches of coyote brush on the inboard levee banks in Reach F.

Ruderal Herbaceous

Ruderal herbaceous vegetation in the LGRP area is dominated by native and nonnative grasses and herbs. This vegetation type is the most common in the LGRP area; there are approximately 37.64 hectares (93 acres) of ruderal herbaceous vegetation throughout reaches A–G (table 3-13).

Ruderal herbaceous vegetation is located on the inboard and outboard levee banks and the terraces adjacent to the low-flow channel. Ruderal herbaceous vegetation can also be found within the understory of the other terrestrial habitat types. Dominant species include

- cocklebur (*Xanthium strumarium*),
- mustard (*Brassica* sp.),
- white sweet clover (*Melilotus albus*),
- ripgut brome (*Bromus diandrus*),
- soft chess (*Bromus mollis*),
- wild oat (*Avena barbata*),
- bristly ox-tongue (*Picris echioides*),
- Bermudagrass (*Cynodon dactylon*),
- perennial peppergrass (*Lepidium latifolium*),
- wild radish (*Raphanus sativus*),
- smilo grass (*Oryopsis miliacea*), and
- western goldenrod (*Euthamia occidentalis*).

Ornamental Landscaping

Ornamental landscaping in the LGRP area consists of isolated non-native trees and shrubs or small clusters of plants. There are 1.46 hectares (3.6 acres) of ornamental landscaping vegetation in the LGRP area (table 3-13). Ornamental landscaping is located primarily on the upper banks on the inboard and outboard sides of the levees. Individual ornamental trees within the riparian forest or scrub canopies were not mapped as ornamental landscaping. Typical ornamental species include holly oak (*Quercus ilex*), English walnut (*Juglans regia*), eucalyptus (*Eucalyptus* spp.), and various cultivated fruit and nut trees.

Special-Status Plants

Special-status plants are defined as species that are legally protected under the California and federal ESAs or other regulations, or species considered sufficiently rare by the scientific community to qualify for such listing. Special-status plants are species in the following categories:

- plants listed or proposed for listing as threatened or endangered under the federal ESA (50 CFR 17.12 [listed plants], and various notices in the *Federal Register* [proposed species]);
- plants that are candidates for possible future listing as threatened or endangered under the federal ESA (62 *Federal Register* [FR] 182:49397–49411, September 19, 1997);
- plants listed or proposed for listing by the State of California as threatened or endangered under the California ESA (14 CCR 670.5);
- plants listed under the California Native Plant Protection Act (California Fish and Game Code sec. 1900 *et seq.*); and
- plants that meet the definition of rare or endangered under CEQA (State CEQA Guidelines sec. 15380), including those considered by the California Native Plant Society (CNPS) to be "rare, threatened, or endangered in California" (lists 1B and 2) (Skinner and Pavlik 1994, California Natural Diversity Database 2001).

Special-status plants that have the potential to occur in the LGRP area were identified from a list provided by USFWS in January 2001 and a California National Diversity Database (CNDDB) search performed in January 2001 (California Natural Diversity Database 2001). The following 8 plant species are listed as endangered under the California ESA:

- robust spineflower (*Chorizanthe robusta*),
- Santa Clara Valley dudleya (*Dudleya setchellii*),
- Contra Costa goldfields (*Lasthenia conjugens*),
- Metcalf Canyon jewelflower (*Streptanthus albidus* ssp. *albus*),
- California sea blite (*Suaeda californica*),
- showy Indian clover (*Trifolium amoenum*),
- Tiburon Indian paintbrush (*Castilleja affinis* ssp. *neglecta*), and
- coyote ceanothus (*Ceanothus ferrisae*).

Tiburon Indian paintbrush is also listed as threatened under the federal ESA (table D-1 in appendix D).

The CNDDB search included all USGS quadrangle maps in which the LGRP area is located (California Natural Diversity Database 2001). The CNDDB search for the baylands mitigation area downstream of the LGRP were the San Jose West and Milpitas 7.5-minute USGS quadrangle maps. Other sources consulted included the CNPS database (Skinner and Pavlik 1994, California Natural Diversity Database 2001), reports of surveys in the area (H. T. Harvey & Associates 1999, 2001), and summaries of surveys in the area (City of San Jose 1998).

Eight listed plant species have the potential to occur in the LGRP area (appendix D); however, based on a review of the USFWS list, the CNDDB searches, and the other available information, none of these species have been observed or are expected to be found in the LGRP area because of a lack of suitable habitat. Formal special-status plant surveys have not been performed for the LGRP because previous surveys have been performed for this area and the project area lacks suitable habitat for special-status species.

Methods and Significance Criteria

This evaluation of impacts on vegetation resources was based on the following sources:

- a list of special-status species provided by USFWS in January 2001,
- a CNDDB search performed in January 2001,
- information collected during site visits in September 1997 and January 2001,
- a wetland delineation performed in 1997 for reaches B–G for the LGRP (H. T. Harvey & Associates 1998),
- a wetland delineation performed in 2000 for the portion of reach A between Airport Parkway and U.S. 101 for the LGRP (H. T. Harvey & Associates 2001),
- a wetland delineation performed in 2000 for the Guadalupe River Project in downtown San Jose, which included the portion of reach A between I-880 and Airport Parkway (Jones & Stokes 2001), and
- contacts with knowledgeable individuals.

The following criteria were used to evaluate the significance of effects on vegetation. These criteria are based on appendix G of the State CEQA Guidelines, appendix A of the District's *Draft CEQA Procedures Manual* (Santa Clara Valley Water District 2001b), and professional judgment. Construction and operation of the LGRP may have a significant effect on vegetation if it would cause

- a substantial permanent adverse effect on wetland, riparian, or other sensitive habitats identified in local or regional plans, policies, or regulations, or by state and federal resource agencies;
- a substantial adverse effect on federally protected wetlands, as defined by Section 404 of the CWA, through direct permanent filling or removal of wetlands, interruption of the hydrology of the area, or other actions that reduce the functions and values of the habitat (considerations include the significance of the habitat, the presence of endangered or threatened species, water quality, and other wetland functions);
- a substantial removal of riparian vegetation or other sensitive habitat in relation to remaining existing habitat in the region, or substantial fragmentation of sensitive habitats;
- temporary removal of more than 0.06 hectare (0.15 acre) of vegetation in an earthen stream channel because of sediment removal activities or flood-control maintenance, unless the project is located in an area where substantial recovery is known to occur within 1 year of removal, there are no known special-status species, and there would be no permanent or temporary effect on federally protected wetlands;
- removal of an ordinance trees, unless it is diseased or infested or poses an imminent threat to people or property;
- direct mortality, permanent habitat loss, or lowered reproductive success for
  - individuals of state-listed or federally listed threatened or endangered plant species or candidates for federal listing; or
  - substantial portions of local populations of plant species that are candidates for state or federal listing or species identified by the CNPS (Skinner and Pavlik 1994, California Natural Diversity Database 2001) as rare, threatened, or endangered in California (CNPS list 1b species).

Riparian vegetation along the lower Guadalupe River consists of native and nonnative trees and shrubs. Any loss of riparian vegetation—whether the vegetation is an isolated tree or a small cluster of trees—is considered significant because this is one of the last remaining areas of riparian habitat in Santa Clara County. ~~Mesic r~~Riparian vegetation located adjacent to the river or wetland habitats is considered to have higher habitat value than ~~xeric~~ riparian vegetation ~~because mesic riparian~~ found on or adjacent to the levees because this vegetation typically has a more diverse canopy structure and layering and a more dense understory, and is usually located near the river's low-flow channel. Although impacts on ~~mesic and xeric~~ all riparian habitat are considered significant, impacts on ~~mesic~~ higher quality riparian habitat would be mitigated at a higher mitigation ratio than ~~xeric~~ the low- to moderate-quality riparian vegetation.

Riparian vegetation along the lower Guadalupe River also provides SRA cover vegetation and wildlife habitat. The loss of SRA cover vegetation is considered significant because this vegetation serves to maintain lower water temperatures, provide instream cover for fish and wildlife, and help maintain bank stability.

Loss of wetland vegetation is considered significant because wetlands are considered a sensitive community and are regulated by the federal government. Wetland vegetation along the lower Guadalupe River provides cover for fish and wildlife species. As with SRA cover vegetation, the loss of wetland vegetation is also considered significant because this vegetation serves to maintain lower water temperatures, provide instream cover for fish and wildlife, and help maintain channel stability.

Natural recovery time was also considered when determining the significance of effects. For example, effects on ruderal vegetation are not generally considered significant because vegetation recovery periods are expected to last only a few years; however, because riparian vegetation is expected to take several decades to mature and provide a significant amount of SRA cover vegetation, the loss of riparian vegetation is generally considered significant.

The impact analysis below assumes a 17,000 cfs floodflow. Potential impacts associated with the additional 1,350 cfs of interior drainage entering the Guadalupe River are addressed in chapter 4, "Cumulative Impacts."

Types of Impacts on Vegetation

The LGRP is expected to result in some temporary and permanent impacts on botanical resources. Temporary or short-term impacts are those that are associated with construction activities and can be replaced in kind, and in approximately the same location, after implementation of the LGRP.

Permanent impacts are those resulting from permanent alteration of landforms as a result of construction or operation of the LGRP structures. Potential effects evaluated in this section include impacts on existing natural communities, special-status plants and their habitats, and sensitive natural communities, including riparian habitat, and wetlands and other waters of the United States.

Alternative 1: No Project

The No-Project Alternative includes existing conditions, as well as what would be expected to occur in the foreseeable future under current maintenance practices if the Proposed Project or another alternative were not approved. No new structural flood-control features would be implemented under the No-Project Alternative. Construction- and maintenance-related activities are summarized in chapter 2, "Proposed Project and Alternatives," and chapters 5 and 6 of the Engineer's Report.

Impact: Loss of Existing Habitats, including Sensitive Natural Communities

Under the No-Project Alternative, no new structural flood-control features would be constructed and the District's current vegetation management program, as described in chapter 2 under the No-Project Alternative, would continue. The current vegetation management program is resulting in the periodic removal of some riparian, wetland, and upland habitats in reaches A–G, mainly near bridge approaches, drainage culverts, and maintenance roads and in areas where natural recruitment is occurring. This vegetation management has altered the normal habitat recruitment processes that would take place in the river corridor if no vegetation management were employed. Under these current maintenance conditions, existing stands of woody riparian and upland vegetation would be retained on the levee banks and in portions of the channel bottom near the low-flow channel; however, natural recruitment beyond the canopies of the existing trees and shrubs would continue to be controlled and would continue to limit the extent of wildlife habitat to approximately its current level. Similarly, vegetation that grows at bridges, near flood-control structures, and on maintenance roads would be removed periodically to ensure the proper function of these structures. Impacts on riparian, wetland, and ruderal vegetation would be minor and limited to vegetation removal needed to maintain existing facilities.

Because vegetation management practices under the No-Project Alternative would not substantially change existing vegetation conditions, this impact is considered less than significant.

Alternative 2: Floodwalls/Levee Raise (Proposed Project)

Implementation of the Proposed Project would result in construction- and vegetation and sediment management-related impacts on vegetation resources and sensitive natural communities. Impacts would include the direct removal of riparian and upland habitats, and filling or removing jurisdictional wetlands and other waters of the United States.

Construction- and vegetation and sediment management-related activities are summarized in chapter 2, "Proposed Project and Alternatives," and chapters 5 and 6 of the Engineer's Report. Impacts on vegetation and sensitive natural resources are summarized in table 3-15.

Impact: Potential for Loss of Riparian, Wetland, and Ruderal Vegetation from Levee Construction and Channel Management Activities

Under the Proposed Project, impacts on approximately ~~1.88~~ 1.67 hectare (~~4.65~~ 4.13 acres) of riparian vegetation, ~~19.82~~ 18.87 hectares (~~48.98~~ 46.62 acres) of wetland vegetation and other waters of the United States, ~~34.62~~ 29.85 hectares (~~85.56~~ 73.72 acres) of ruderal vegetation, and 32 m (104 feet) of SRA overhead cover vegetation would result from levee construction activities and sediment and vegetation management in the channel (table 3-15). The impact analysis addresses the relative habitat effects attributed to LGRP construction and impacts related to initial channel modifications and routine vegetation and sediment management that would be mitigated under the District's SMP. The Proposed Project would avoid the loss of SRA overhead cover vegetation from construction activities and would have minimal impacts on SRA cover from sediment and vegetation management at bridge approaches.

Based on the habitat quality assessment, levee construction would primarily affect ~~lower~~ moderate-quality riparian forest vegetation located away from the low-flow channel on the sides and tops of levees. Removal of vegetation outside bridge transition zones would have no impact on established riparian forest because herbicide treatment of riparian recruits would be applied only in these areas. Low- to high-quality wetland habitat could be permanently lost from maintenance roads and drainage outfalls in reaches A–G. The highest quality wetland loss would be in reach G.

Levee Construction Impacts

Construction of structural features under the Proposed Project would affect ~~1.01~~ 0.87 hectare~~s~~ (~~2.74~~ 2.16 acres) of riparian vegetation (~~0.94~~ 0.75 hectare [~~2.33~~ 1.86 acre] of riparian forest and ~~0.17~~ 0.12 hectare [~~0.41~~ 0.30 acre] of riparian scrub vegetation). Riparian habitat affected by the Proposed Project is primarily located on the inboard and outboard sides of the levees and at bridge approaches associated with proposed maintenance road undercrossings. Construction-related impacts would avoid existing riparian vegetation located within the 6-m (20-foot)-wide buffer zone along each side of the channel and in most of the floodplain (see appendix G).

Under the Proposed Project, construction of flood-control features would result in a loss of approximately ~~1.2~~ 1.27 hectare (~~2.98~~ 3.14 acres) of wetland vegetation; ~~0.05~~ 0.29 hectare (~~0.12~~ 0.71 acre) of nontidal freshwater marsh and ~~1.16~~ 0.98 hectare (~~2.86~~ 2.43 acres) of tidal freshwater marsh would be lost (table 3-15). Impacts to nontidal freshwater marsh include 0.19 hectare (0.48 acre) of permanent impacts and 0.09 hectare (0.23 acre) of temporary impacts. Impacts to tidal freshwater marsh include 0.83 hectare (2.05 acres) of permanent impacts and 0.15 hectare (0.38 acre) of temporary impacts. Because the construction features for the Proposed Project are located primarily on the tops of existing levees, construction-related effects on wetlands and other waters of the United States would occur primarily in the vicinity of SR 237, at bridge approaches, and in reach G where new maintenance roads would be constructed in the channel bottom adjacent to levees (figures 2-8 and 2-9).

Construction of flood-control project features would affect ~~0.08~~ 0.80 hectare (~~0.19~~ 1.98 acre) of other waters of the United States, including open water (table 3-15). Impacts to other waters of the United States include 0.21 hectare (0.51 acre) of permanent impacts and 0.60 hectare (1.47 acres) of temporary impacts. Replacement of the SR 237 bridge would result in temporary effects on other waters of the United States. No discharge of dredged and fill material would affect jurisdictional wetlands in this area. In-channel wetland vegetation that is affected in the vicinity of SR 237 is expected to naturally recolonize in the affected areas after completion of construction activities. Bridge scour protection areas in reaches A–D would result in temporary effects on wetlands and other waters of the United States. Vortex rock weirs in reach A would be placed in the low-flow channel immediately downstream of I-880, but would be sited to avoid seasonal or perennial freshwater wetlands. In addition, wetlands located in a drainage ditch immediately adjacent to the reach F levee (on the land side of the

Table 3-15. Summary of Impacts on Vegetation in the Lower Guadalupe River Project Area under the Proposed Project

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	Extent of Impact by Project Reach							
	A	B	C	D	E	F	G	
Habitat Type	I-880 to U.S. 101	U.S. 101 to Trimble Road	Trimble Road to Montague Expressway	Montague Expressway to Hetch Hetchy Aqueduct Crossing	Hetch Hetchy Aqueduct Crossing to Tasman Road	Tasman Drive to SR 237	SR 237 to Union Pacific Railroad Bridge Crossing	Total
Terrestrial Habitats								
Riparian Forest (acres)								
Levee construction	0.11	0.31	0.84	0.41	0.01	0.01	–	1.69
Veg. management	–	–	–	–	–	–	–	0.00
Sediment management	–	0.55	0.13	0.05	–	–	–	0.73
Bridge transition zones	0.09	–	0.07	0.01	–	–	–	0.17
Riparian Scrub (acres)								
Levee construction	0.02	0.40 0	0.20	0.03	–	–	–	0.29
Veg. management	0.14	–	–	0.60	–	–	–	0.74
Sediment management	–	–	0.44	0.06	–	–	–	0.50
Bridge transition zones	0.01	–	–	–	–	–	–	0.01
SRA Cover (linear feet)								
Levee construction	–	–	–	–	–	–	–	–
Veg. management	–	–	–	–	–	–	–	–
Sediment management	–	–	44.00 (feet)	–	–	–	–	44.00 (feet)
Bridge transition zones	–	–	30.00	30.00	–	–	–	60.00

Table 3-15. Continued

	Extent of Impact by Project Reach							
	A	B	C	D	E	F	G	
Habitat Type	I-880 to U.S. 101	U.S. 101 to Trimble Road	Trimble Road to Montague Expressway	Montague Expressway to Hetch Hetchy Aqueduct Crossing	Hetch Hetchy Aqueduct Crossing to Tasman Road	Tasman Drive to SR 237	SR 237 to Union Pacific Railroad Bridge Crossing	Total
			(feet)	(feet)				(feet)
Ruderal scrub (acres)								
Levee construction	0.30	0.06	0.45	0.12	0.59	0.31	0.09	1.92
Veg. management	2.32	–	–	0.04	0.04	0.11	–	2.51
Sediment management	–	0.01	–	–	–	–	–	0.01
Bridge transition zones	0.12	0.03	0.02	0.01	–	–	–	0.18
Ruderal herbaceous (acres)								
Levee construction	1.22	3.45	10.34	10.72	6.20	8.11	3.25	43.29
Veg. management	10.04	0.58	1.39	4.69	0.82	0.81	0.12	18.45
Sediment management	–	2.31	2.49	0.86	0.74	–	0.04	6.44
Bridge scour protection areas	0.08	0.14	0.25	0.45	–	–	–	0.92
Ornamental landscaping (acres)								
Levee construction	0.13	0.05	0.42	0.35	0.07	0.82	0.08	1.92

Table 3-15. Continued

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	Extent of Impact by Project Reach							
	A	B	C	D	E	F	G	
Habitat Type	I-880 to U.S. 101	U.S. 101 to Trimble Road	Trimble Road to Montague Expressway	Montague Expressway to Hetch Hetchy Aqueduct Crossing	Hetch Hetchy Aqueduct Crossing to Tasman Road	Tasman Drive to SR 237	SR 237 to Union Pacific Railroad Bridge Crossing	Total
Veg. management	0.73	–	–	–	–	–	–	0.73
Sediment management	–	–	–	–	–	–	–	–
Bridge scour protection areas	–	–	0.01	–	–	–	–	0.01
Aquatic Habitats								
Nontidal Freshwater Marsh (acres)								
Levee construction	0.21	0.07	0.20	–	–	–	–	0.48
Veg. management	1.70	0.08	1.71	–	–	–	–	3.49
Sediment management	–	0.86	2.99	–	–	–	–	3.85
Bridge scour protection areas	0.07	0.10	0.06	–	–	–	–	0.23
Tidal Freshwater Marsh (acres)								
Levee construction		–	–	–	0.03	0.57	1.82	2.42
Veg. management		–	–	3.06	5.78	12.05	6.40	27.29
Sediment management	–	–	–	0.75	1.96	–	3.51	6.22
Bridge scour protection areas	–	–	–	0.01	–	–	–	0.01
Other Waters of the United States (acres)								
Levee construction	0.37	0.07	0.01	–	–	0.03	0.02	0.50
Veg. management	0.02	–	–	–	–	–	–	0.02
Sediment management	–	0.24	–	0.01	–	–	0.02	0.27

Table 3-15. Continued

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	Extent of Impact by Project Reach							
	A	B	C	D	E	F	G	
Habitat Type	I-880 to U.S. 101	U.S. 101 to Trimble Road	Trimble Road to Montague Expressway	Montague Expressway to Hetch Hetchy Aqueduct Crossing	Hetch Hetchy Aqueduct Crossing to Tasman Road	Tasman Drive to SR 237	SR 237 to Union Pacific Railroad Bridge Crossing	Total
Bridge scour protection areas	0.64	0.32	0.32	0.17	–	–	–	1.45
Open Water (acres)								
Levee construction	0.01	–	–	–	–	–	–	0.01
Veg. management	–	0.02	–	–	–	0.03	0.02	0.07
Sediment management	–	0.03	0.20	0.06	–	–	–	0.29
Bridge scour protection areas	–	0.01	–	–	0.01	–	–	0.02

levee) could be temporarily affected by levee construction activities, but would not be permanently filled.

Construction activities would result in the loss of approximately ~~20.8~~ 18.75 hectares (~~51.34~~ 46.31 acres) of ruderal vegetation (table 3-15). Because ruderal vegetation is the most dominant cover type in most of the project reaches, construction impacts on this habitat type would be substantial. However, this impact is considered less than significant because ruderal vegetation is not considered a sensitive natural community and is a common cover type in the LGRP area.

Vegetation and Sediment Management Impacts

Sediment and vegetation management removal activities associated with the Proposed Project would result in the loss of up to approximately ~~0.77~~ 0.79 hectare (~~1.91~~ 1.97 acre) of riparian vegetation, ~~18.62~~ 16.53 hectares (~~46.0~~ 40.85 acres) of wetland vegetation, 0.26 hectare (0.65 acre) of other waters of the United States, including open waters; and ~~13.85~~ 11.10 hectares (~~34.22~~ 27.41 acres) of ruderal vegetation (table 3-15). Vegetation management impacts in reaches A–G would result from cutting and hand removal, herbicide application, or excavation of sediment management areas in the channel (see appendix G). Riparian and wetland habitat would be lost in reaches B–E during sediment excavation activities. All impacts would occur outside of established buffer zones adjacent to the low-flow channel (please refer to chapter 6 of the Engineer's Report for a detailed description of vegetation and sediment management guidelines).

After completion of the initial vegetation-removal activities, a vegetation control plan would be implemented to control natural recruitment of wetland vegetation in these areas (Santa Clara Valley Water District 2001a). Vegetation management would take place within approximately the same management zones on an annual or semiannual basis through the life of the LGRP (see appendix G). Although the total area of ruderal vegetation is not expected to change, the dominant plant species may be altered through the removal and control of woody vegetation.

Determination

The loss of ~~1.88~~ 1.67 hectare (~~4.65~~ 4.13 acres) of riparian vegetation and ~~19.82~~ 18.87 hectares (~~48.98~~ 46.62 acres) of wetland vegetation and other waters of the United States from LGRP construction- and sediment and vegetation management-related activities is considered a significant impact because

- some riparian and wetland vegetation would be lost permanently from levee/floodwall construction and
- a substantial quantity of sensitive riparian and wetland vegetation would be removed from the channel during vegetation and sediment management activities and periodically from routine maintenance of the "as built" channel.

Implementation of Mitigation Measure V-1 below would reduce this impact to a less-than-significant level by replacing and compensating for loss of riparian and wetland vegetation.

The temporary effects on waters of the United States are considered less than significant because the Proposed Project would not result in substantial changes to the lower Guadalupe River's low-flow channel.

The loss of ~~34.62~~ 29.85 hectares (~~85.56~~ 73.72 acres) of ruderal vegetation from construction and sediment and vegetation management activities under the Proposed Project is considered less than significant because ruderal vegetation is not considered a sensitive natural community and is a common cover type in the LGRP area. In addition, the quantity and quality of ruderal vegetation temporarily removed under the Proposed Project would be replaced by upland restoration activities, including erosion control activities, that would take place on levees and adjacent to new maintenance roads in the LGRP area.

Mitigation Measure V-1: Replace or Compensate for Loss of Riparian and Wetland Habitat from Levee Construction and Vegetation Management

The District will replace or compensate for the loss of ~~1.88~~ 1.67 hectares (~~4.65~~ 4.13 acres) of riparian vegetation and ~~19.82~~ 18.87 hectares (~~48.98~~ 46.62 acres) of wetland vegetation and other waters of the United States from levee construction and vegetation and sediment management required under the LGRP. To implement this mitigation, the District will develop and carry out an implementation plan. The implementation plan will take into consideration the quality and type of riparian and wetland habitat losses, and the mitigation that will be provided for the lower Guadalupe River under the District's SMP. Mitigation of impacts related to construction of flood-control structures will not be covered under the SMP.

The implementation plan will be developed by the District to ensure that required mitigation plantings are successful. The implementation plan will identify the exact location and quantity of mitigation planting areas; the quantity, size, and type of mitigation plantings; installation and maintenance techniques; and monitoring and reporting requirements. For construction-related impacts on riparian and wetland habitat, the District will replant riparian vegetation in ~~the reach A channel~~ reaches A, B, and C and wetland vegetation in District Pond A4~~, respectively~~. For initial and routine vegetation and sediment management–related impacts, the District will mitigate impacts on riparian and wetland habitat with mitigation included in the SMP mitigation package and with additional mitigation proposed under the LGRP.

Mitigation of Riparian and Shaded Riverine Aquatic Overhead Cover. Levee construction impacts on riparian vegetation under the Proposed Project would be approximately ~~1.11~~ 0.87 hectare (~~2.74~~ 2.16 acres) (~~0.94~~ 0.75 hectare [~~2.33~~ 1.86 acre] of riparian forest and ~~0.17~~ 0.12 hectare [~~0.41~~ 0.30 acre] of riparian scrub). Loss of this amount of riparian vegetation would be replaced at on-site locations within the LGRP area..

On-site mitigation areas will include areas within the project levees and on-site mitigation areas that are within the project levees will be located in reaches A, B, and C.

~~in reach A within the 4.6-m (15-foot)-wide low-flow buffer area between Airport Parkway and U.S. 101. A mitigation ratio of 0.5:1 is proposed in this mitigation area because riparian forest impacts from the Proposed Project would be mainly associated with removal of relatively low-quality "xeric" riparian vegetation that is currently located on lower Guadalupe River levees. Successful replacement riparian vegetation would create up to 1,000 linear meters (3,280 feet) of high-quality SRA cover habitat located immediately adjacent to the low-flow channel. Benefits of planting in this area include increased habitat value for common wildlife, water temperature improvement, and greater overall habitat values in reach A associated with the proximity of the Corps and Caltrans mitigation planting areas.~~

~~The remaining 0.77 hectare (1.91 acres) of riparian vegetation impact associated with sediment and vegetation management in the channel on 0.37 hectare (0.91 acre) of riparian forest and 0.4 hectare (1.0 acre) of riparian scrub were identified in the District's SMP and will be mitigated as part of the SMP mitigation package by removing giant reed from the lower Guadalupe River and in other watersheds.~~

Overall, the streamside mitigation areas in reaches A and B would increase the functions and values for terrestrial species by providing a more diverse canopy structure and by providing a near-continuous corridor of riparian vegetation adjacent to the low-flow channel. These mitigation areas would also increase the functions and values of the existing habitat for aquatic species by providing overhead and instream SRA cover for aquatic species. The streamside mitigation areas in reaches A and B would connect the lower reaches of the Guadalupe River (i.e., reaches C–G) and the proposed mitigation areas associated with the other flood protection projects along the Guadalupe River and Guadalupe Creek.

On-Site Riparian Mitigation Areas

The District will provide 3:1 mitigation for impacts to riparian habitat associated with the LGRP. This mitigation ratio was agreed upon in consultation with DFG. Based on this mitigation ratio, the District proposes to mitigate the 0.87 hectare (2.16 acres) of construction-related impacts by providing at least 2.62 hectares (6.48 acres) of riparian mitigation at on-site mitigation areas.

Prior to agreeing to provide 3:1 mitigation, the District developed an assessment method to determine riparian impacts and mitigation requirements for the LGRP. This methodology was developed as a means of determining a reasonable approach to mitigating construction-related impacts on riparian habitat in the LGRP and determining a mitigation ratio for impacts on riparian habitat by comparing construction-related impacts with the quality of those affected habitats. Under this previous approach, all polygons of high-quality habitat would have been mitigated at a 3:1 ratio because these areas provide the most value to wildlife and fisheries resources. Areas of moderate-quality habitat would be mitigated at 2:1 because these areas have slightly less value to wildlife and fisheries resources. The 3:1 and 2:1 ratios would have mitigated not only for the overall loss of habitat quality and quantity, but also the temporal loss of habitat. Areas of low-quality habitat would have been mitigated at 1:1 because these areas have less value to wildlife and fisheries resources.

The on-site mitigation areas in reaches A, B, and C would provide approximately 2.80 hectares (6.90 acres) of riparian mitigation for levee construction activities. This mitigation represents a ratio of approximately 3.2:1. Overall, the on-site mitigation areas in reaches A, B, and C will increase the functions and values for terrestrial species by providing a more diverse canopy structure and by providing a near-continuous corridor of riparian vegetation adjacent to the low-flow channel. The reach A mitigation area and portions of the reach C mitigation area will also increase the functions and values of the existing habitat for aquatic species by providing overhead and instream SRA cover for aquatic species. The mitigation areas in reaches A and B would connect the lower reaches of the Guadalupe River (i.e., reaches C–G) and the proposed mitigation areas associated with the other flood protection projects along the Guadalupe River and Guadalupe Creek.

The on-site mitigation areas are discussed in the following sections.

Reach A Mitigation Area. The Reach A mitigation area is located between U.S. 101 and Airport Parkway. In Reach A, approximately 0.76 hectare (1.88 acre) of riparian mitigation will be implemented. Mitigation will include planting riparian vegetation on the east and west banks of the river within 4.6 meters (15 feet) of the low-flow channel and planting the bank and lower floodplain associated with the levee setback area on the east bank, between U.S. 101 and Airport Island Bridge.

The District prepared a conceptual mitigation design plan for the streamside planting portion of this mitigation project site as part of the Draft EIR. This plan was reviewed by representatives of various resource agencies and the mitigation plan was revised based on agency comments. The levee setback was not initially included as part of the conceptual design plan. Construction plans and specifications are being prepared for the streamside planting and setback levee portions of this mitigation area and will be finalized in conjunction with the final construction plans and specifications for the LGRP.

The primary goal of the Reach A mitigation project design is to create persistent riparian forest habitat and overhead SRA cover habitat. This mitigation site was designed to maximize the amount of riparian habitat that can be established based on the hydraulic limitations of this project reach.

The streamside planting design will provide approximately 0.67 hectare (1.66 acre) of riparian habitat mitigation and approximately 1,433 meters (4,700 linear feet) of overhead SRA cover. Plants will be installed on both the east and west banks at approximately 3.7 meters (12 feet) on center. All plants will be installed within 4.6 meters (15 feet) of the wetted channel perimeter. The plant palette will consist of native tree, shrub, and vine species. Plant propagation materials will be collected in the vicinity of the project or within the Guadalupe River watershed. A temporary irrigation system is proposed to provide deep watering to the plants immediately after installation and during the short-term establishment period.

The setback levee portion of the Reach A mitigation project will provide an additional 0.09 hectare (0.22 acre) of riparian mitigation on the east bank between U.S. 101 and the Airport Island Bridge. The existing bank will be set back and the bank and the lower floodplain adjacent to the future depressed maintenance road planted and seeded with an erosion control seed mix. Although these planting areas will not be located adjacent to the low-flow channel, they will increase the overall riparian habitat area in the reach, as well as in the LGRP as a whole.

Reach B Mitigation Area. The reach B mitigation area is located between Trimble Road and U.S. 101. The District is currently preparing a conceptual mitigation design plan for this mitigation project site. Construction plans and specifications are being prepared for this mitigation project site and will be finalized in conjunction with the final construction plans and specifications for the LGRP.

Mitigation in reach B is made possible by constructing a levee setback on the west bank approximately between station 14+100 and station 14+500. The setback levee is considered a project enhancement and is not required for flood protection purposes. The levee setback will allow the District to minimize sediment management activities in this reach and allow for the planting of riparian vegetation.

In reach B, approximately 0.90 hectare (2.23 acres) of riparian mitigation will be implemented in the setback levee area. Mitigation plantings will be installed on the created floodplain and the lower one-third of the setback levee. Only shrub and vine species will be planted on the setback levee. The setback levee will be seeded with an erosion control seed mix. Unlike Reach A, some sediment removal may be required in reach B on an as-needed basis. A maintenance road will be located between the sediment removal area and the planting area to facilitate sediment removal activities.

The existing levee will be set back approximately 30 meters (98 feet) at the upstream end of the reach and the setback will average approximately 20 meters (66 feet) in other locations. The plant palette will consist of native tree, shrub, and vine species. Plant propagation materials will be collected in the vicinity of the project or within the Guadalupe River watershed. A temporary irrigation system is proposed to provide deep watering to the plants immediately after installation and during the short-term establishment period.

Reach C Mitigation Area. The reach C mitigation area is located between Montague Expressway and Trimble Road. This mitigation area will provide approximately 1.13 hectare (2.78 acres) of riparian mitigation. Construction plans and specifications are being prepared for this mitigation project site and will be finalized in conjunction with the final construction plans and specifications for the LGRP.

Mitigation activities in Reach C will consist of planting native riparian vegetation in several areas within the existing riparian corridor that are currently dominated by nonnative herbaceous vegetation (e.g., sweet fennel, poison hemlock, giant reed) and nonnative woody vegetation, (e.g., Himalayan blackberry, black walnut, weeping willow). A total of 18 planting areas totaling 1.13 hectare (2.78 acres) have been identified in Reach C. These planting areas vary in proximity to and elevation above the river.

The plant palette will consist of native tree, shrub, and vine species. Plant propagation materials will be collected in the vicinity of the project or within the Guadalupe River watershed. A temporary irrigation system is proposed to provide deep watering to the plants immediately after installation and during the short-term establishment period.

Sediment and Vegetation Management Mitigation. The remaining ~~0.77~~ 0.79 hectare (~~1.91~~ 1.97 acre) of riparian vegetation impact associated with sediment and vegetation management in the channel on ~~0.37~~ 0.29 hectare (~~0.91~~ 0.73 acre) of riparian forest and ~~0.4~~ 0.50 hectare (~~1.0~~ 1.24 acres) of riparian scrub were identified in the District's SMP and will be mitigated as part of the SMP mitigation package. The mitigation package will include removing giant reed from the lower Guadalupe River and in other watersheds in the District's jurisdiction and restoring riparian vegetation in these areas.

Mitigation of Wetlands and Other Waters of the United States. Levee construction impacts on wetlands and other waters of the United States, including open water, under the Proposed Project would be approximately 18.87 hectares (46.62 acres).

Impacts related to construction of flood-control features would result in the permanent loss of 1.23 hectare (3.04 acres) of nontidal and tidal wetlands and other waters of the United States, and the temporary loss of 0.84 hectare (2.08 acres) of nontidal and tidal wetlands and other waters of the United States.

Impacts related to sediment and vegetation management actions would result in the temporary loss of 16.53 hectares (40.85 acres) of wetlands and the temporary loss of approximately 0.26 hectares (0.65 acres) of other waters of the United States.

Of the 16.53 hectares (40.85 acres) of wetland vegetation impacts resulting from sediment and vegetation management activities in the LGRP, a total of 7.93 hectares (19.60 acres) were identified in the SMP and will be mitigated as part of the SMP package. The impacts identified in the SMP include 2.55 hectares (6.30 acres) of nontidal wetland and 5.40 hectares (13.30 acres) of tidal wetland impacts The SMP wetland mitigation package is described in the following section. The LGRP will affect 8.60 hectares (21.25 acres) of additional nontidal and tidal wetlands not previously identified in the SMP. Mitigation for the additional nontidal and nontidal wetland impacts will occur in Pond A4.

The District's Pond A4 will serve as the mitigation site for all impacts to wetlands and other waters of the United States associated with project construction as well as for impacts associated with sediment and vegetation management. The District is currently planning for and designing wetland restoration for Pond A4, which is 121.4 hectares (300 acres); restoration is expected to begin in 2007. The District is proposing to use a ratio of 2:1 to compensate for permanent impacts and a ratio of 1:1 to compensate for temporary impacts on wetland resources, as well as other water of the United States. Based on a 2:1 compensation ratio for permanent impacts, the District will compensate for the permanent loss of 1.04 hectare (2.56 acres) of tidal wetlands and other waters of the United States due to construction and sediment and vegetation management activities by providing 2.08 hectares (5.12 acres) of wetland mitigation in Pond A4. Based on a 1:1 compensation ratio for temporary impacts, the District will compensate for the temporary loss of 9.19 hectares (22.71 acres) of tidal wetlands and other waters of the United States due to construction and sediment and vegetation management activities by providing 9.19 hectares (22.71 acres) of wetland mitigation in Pond A4. Because Pond A4 will not be restored prior to LGRP construction, the District will, in addition, remove 3 acres of exotic vegetation in the project area to compensate for the lag time between the impact and the habitat restoration.

Mitigation of Nontidal Freshwater Marsh and Seasonal Wetland. A total of 0.71 hectare (1.75 acres) of nontidal wetland impacts will occur under the LGRP, including 0.42 hectare (1.04 acre) related to vegetation and sedimentation management activities and 0.29 hectare (0.71 acre) because of construction-related impacts. Approximately 2.55 hectares (6.3 acres) of nontidal wetland impacts from vegetation and sediment management were identified in the District's SMP and will be mitigated as part of the Freshwater Wetland Creation (FWC) and Stream and Watershed Protection (SWP) components of the SMP mitigation package. As part of the LGRP, an additional ~~0.61~~ 0.42 hectare (~~1.50~~ 1.04 acres) of nontidal wetlands would be affected by additional vegetation and sediment management requirements. Mitigation of the impact on ~~0.61~~ 0.71 hectare (~~1.50~~ 1.75 acres) of nontidal wetlands will be provided out-of-kind at a 2:1 mitigation ratio in Pond A4.

Mitigation for Sediment and Vegetation Management Impacts Identified in the SMP.

The District has developed the FWC and SWP components of the SMP to compensate for maintenance-related impacts on freshwater wetland vegetation (Santa Clara Valley Water District 2001). The FWC and SWP components will compensate for impacts on freshwater wetlands from routine maintenance in stream channels and canals, respectively, in the Santa Clara and Pajaro basins. The FWC component of the SMP currently identifies 4.05 hectares (10 acres) of potential wetland mitigation in the Santa Clara basin. The SWP component indicates that approximately 372–490 hectares (920–1,210 acres) of land and conservation easements will be purchased to preserve, protect, and improve streams and their associated watersheds in the county (Santa Clara Valley Water District 2001).

The FWC component wetlands include the creation of seasonal or perennial wetlands at the Los Capitancillos Site and the creation of near-perennial freshwater wetlands at Coyote Lakes Park Site 10A. Both sites are located in San Jose. The District is also discussing the potential use of Coyote Lakes Park Site 10A with the Santa Clara County Parks and Recreation Department, which owns the property.

The SWP component would include the purchase of approximately 372–490 hectares (920–1,210 acres) of land and conservation easements to preserve, protect, and improve streams and associated watersheds in Santa Clara County. This component would focus on the preservation and improvement of streams that are in a fairly undisturbed state and good ecological condition. This component may also include some restoration and management of acquired lands.

Mitigation of Tidal Freshwater Marsh. Cargill Salt Pond A4 will serve as the mitigation site for all tidal freshwater marsh mitigation for construction and vegetation/sediment management impacts associated with the LGRP (Santa Clara Valley Water District 2001) (figure 1 in appendix E). The site is owned by the District. The current area of Cargill Salt Pond A4 is approximately 121.4 hectares (300 acres). The District is currently working on the plans and design for this site. Construction is expected to begin in 2007. Approximately 16.7 hectares (41.2 acres) of tidal freshwater marsh habitat will be restored at a minimum ratio of 1:1 to compensate for permanent and temporary impacts on tidal freshwater marsh. Approximately 5.4 hectares (13.3 acres) of tidal wetland impacts from vegetation and sediment management were identified in the District's SMP and will be mitigated as part of the SMP mitigation package in Pond A4. As part of the LGRP, an additional 11.3 hectares (27.9 acres) of tidal wetlands would be affected by levee construction and additional vegetation and sediment management requirements. Mitigation of the impacts on 11.3 hectares (27.9 acres) of tidal wetlands will be provided in Pond A4. This compensation is reasonable because of the variable quality of tidal freshwater marsh in reaches D–G (marsh habitat in reaches F and G is rated as high-quality while marsh habitat in reaches D and E are of variable quality). Please refer to the evaluation of habitat quality.

Cargill Salt Pond A4 is bordered on the west by the Sunnyvale West Channel, on the northeast by Guadalupe Slough, and to the southeast by the Sunnyvale East Channel. This mitigation site, which was historically a tidal marsh, is expected to support tidal freshwater marsh similar to or of higher quality than the existing tidal freshwater marshes that will be affected by periodic maintenance activities in the LGRP. The District anticipates that a mosaic of mudflat, tidal wetland, and upland habitats will be created. The restoration concept for this site includes

- lowering the outboard levees or breaching them in strategic locations to provide full tidal action to the site; and
- placing of dredge fill and grading, in combination with natural sedimentation, to create surfaces at an elevation at which tidal wetland and upland vegetation can become established.

Mitigation of Ruderal Vegetation. Although the loss of ruderal vegetation is not considered a significant impact, the routine construction specifications and BMPs used by the District will restore any such vegetation. As identified in the SMP's Resource Protection Policies, Policy 8, the District will take measures to minimize erosion by minimizing vegetation removal and restoring vegetation on disturbed soils. Because of hydraulic constraints, disturbed soil surface in the LGRP project area will be revegetated by seeding grasses and forbs on the inboard side of the levee.

Impact: Potential for Loss of Riparian and Wetland Vegetation Resulting from Changes in Hydraulic Conditions

As discussed in the "Hydrologic and Hydraulic Conditions" section of this chapter, hydraulic conditions resulting from the Proposed Project were assessed to determine the potential for increases in water velocities in the LGRP area. Hydraulic modeling indicated that there could be some effect on vegetation in the areas upstream and downstream of bridges, particularly Trimble Road and Montague Expressway. In addition, reach C would experience an increase in mean velocity over preproject conditions. Although there would be increases in water velocities around bridge crossings and in reach C, these increases are not expected to result in significant impacts on riparian and wetland vegetation because velocities would not be great enough to cause appreciable vegetation loss.

The LGRP proposes bridge transition zones in areas 30.5 m (100 feet) upstream and downstream of all bridges. Vegetation management in these areas would include the removal of woody vegetation: herbaceous vegetation would not be removed. Wetland vegetation, which would be removed within the channel if it poses a threat to channel capacity, is usually scoured by high-flow events on an annual or semiannual basis.

Although the Proposed Project would increase the channel capacity and water velocities in portions of the LGRP area, the increase would not be appreciable, would represent a minimal increase over preproject conditions, and is considered less than significant. No mitigation is required.

Impact: Loss of Special-Status Species or Potential Habitat for Special-Status Species

Special-status plants that have the potential to occur in the LGRP area were identified from a list provided by USFWS (U.S. Fish and Wildlife Service 2001) and a CNDDB search performed in January 2001. Eight listed species and 25 species of concern were identified as having the potential to occur in the LGRP area (appendix D); however, based on a review of the USFWS list, the CNDDB searches, and the other available information, none of these species have been observed or are expected to be found in the LGRP area because of a lack of suitable habitat. There would be no impacts on special-status plant species, such as Congdon's tarplant, downstream of the LGRP because these species are unlikely to occur in the area and would not be affected by infrequent flooding in and around Alviso Slough. Therefore, the Proposed Project would not affect special-status plant species, and this impact is considered less than significant. No mitigation is required.

Impact: Potential for Loss of Ornamental Vegetation from Construction and Maintenance Activities

Under the Proposed Project, construction-related activities would result in the loss of approximately 0.85 hectare (2.11 acres) of ornamental vegetation, and sediment and vegetation management activities would result in the loss of 0.31 hectare (0.77 acre) (table 3-15). Ornamental vegetation that would be affected by construction-related activities is located primarily along the ROW boundaries on the outboard side of the levee. Much of this vegetation is located on or adjacent to existing landscapes for surrounding commercial and residential developments. Ornamental vegetation that would be affected by sediment and vegetation management is located primarily along the levee banks on the inboard side of the levee.

The loss of ornamental vegetation is less than significant because ornamental vegetation is not considered a sensitive natural community. In addition, the quantity and quality of ornamental vegetation affected in the landscapes for surrounding commercial and residential developments would be fully replaced. No mitigation is required.

Impact: Potential Loss of Diked Salt Marsh Habitat in New Chicago Marsh

Under existing conditions, New Chicago Marsh is potentially subject to inundation of up to approximately 1.8 m (6.0 feet) ~~2.2 m (7.2 feet)~~ deep. Under the Proposed Project, flooding of the marsh habitat would be reduced to approximately 0.8 m (2.6 feet) ~~1.3 m (4.3 feet)~~ deep. Therefore, the impact on salt marsh habitat in New Chicago Marsh from Proposed Project flooding is considered less than significant. No mitigation is required.

Impact: Potential Loss of Marsh Vegetation within Alviso Slough Because of Flooding

The Proposed Project would result in increased flows in Alviso Slough downstream of the UPRR. Hydraulic modeling indicates that the change in water surface elevations under existing conditions during a 400-cms (14,000-cfs) event compared to the design flow resulting from a 481-cms (17,000-cfs) event is less than a 0.15-m (0.5-foot) increase from the UPRR bridge to the Alviso marina, and that downstream of the marina there would be no increase in water surface elevations in Alviso Slough. The additional flow downstream of the UPRR bridge to the marina under the Proposed Project is not expected to affect the various tidal freshwater, brackish, or salt marsh habitats within the slough, all of which are adapted to brief inundation and changes in salinity resulting from freshwater intrusion. Therefore, the impact to marsh habitats within Alviso Slough resulting from the Proposed Project is considered less than significant. No mitigation is required.

Alternative 3: Channel Bank Modification

Implementation of the Channel Bank Modification Alternative would result in construction- and sediment and vegetation management-related impacts on vegetation resources and sensitive natural communities. Impacts would include the direct removal of riparian and ruderal habitats, and filling or removing jurisdictional wetlands and other waters of the United States. Overall, construction-related impacts would be slightly greater than those identified under the Proposed Project, and initial sediment and vegetation management-related activities would be slightly less than those identified under the Proposed Project.

Construction- and channel management-related activities are summarized in chapter 2, "Proposed Project and Alternatives," and chapters 5 and 6 of the Engineer's Report. Impacts on vegetation and sensitive natural resources are summarized in table 3-16.

Impact: Potential for Loss of Riparian, Wetland, and Ruderal Vegetation from Levee Construction and Channel Management Activities

Under the Channel Bank Modification Alternative, the loss of approximately 1.3 hectares (3.3 acres) of riparian vegetation, 20.1 hectares (49.6 acres) of wetland vegetation, and 34.71 hectares (85.77 acres) of ruderal vegetation, and 32 m (104 feet) of SRA overhead cover vegetation would result from construction activities and moderate to aggressive sediment and vegetation management (table 3-16).

Levee Construction Impacts

Construction under this alternative would cause the loss of 0.57 hectare (1.42 acre) of riparian vegetation. These impacts would be less than those identified under the Proposed Project because more of the construction would take place on the inboard sides of the levees and the channel bottom in reaches D–G and less in upstream reaches that support riparian vegetation.

There would be a loss of approximately 0.98 hectare (2.41 acres) of wetland vegetation from construction-related impacts (table 3-16). The effects on wetland habitat under this alternative are slightly less than those identified under the Proposed Project; channel bank modification structures would be constructed in the levee footprint, particularly in reach G, so construction of a new maintenance road in the reach G channel would not be required. Impacts on wetlands would also occur in areas similar to those identified under the Proposed Project.

There would be a loss of approximately 16.9 hectares (41.8 acres) of ruderal vegetation from construction activities (table 3-16). Because ruderal vegetation is the most dominant cover type in most project reaches, permanent impacts on ruderal vegetation would be greater than those identified under the Proposed Project. More of the structural features are located on the inboard sides of the levees (i.e., in reaches D–G in the footprint of the MSE structures) than on the outboard sides.

Vegetation and Sediment Management Impacts

Sediment and vegetation management removal activities would result in the loss of approximately 0.77 hectare (1.91 acres) of riparian vegetation (0.37 hectare [0.91 acre] of riparian forest and 0.4 hectare [1 acre] of riparian scrub), 19.1 hectares (47.2 acres) of wetland (3.2 hectares [7.93 acres] of nontidal freshwater wetland and 15.9 hectares [39.3 acres] of tidal freshwater wetland), 17.8 hectares (43.97 acres) of ruderal vegetation, and 32 m (104 feet) of SRA overhead cover vegetation (table 3-16). Sediment and vegetation management activities under the Channel Bank Modification Alternative would be similar to those identified under the Proposed Project; however, the total effect on each habitat type varies slightly under this alternative because the overall area requiring vegetation management under this alternative would be slightly less in reaches D-G than that under the Proposed Project (see appendix G).

Determination

The loss of 1.34 hectares (3.30 acres) of riparian vegetation, 32 m (104 feet) of SRA overhead cover vegetation, and 20.1 hectares (49.6 acres) of wetland vegetation from construction- and initial channel modification–related activities under this alternative is considered a significant impact because

- relatively small amounts of sensitive riparian and wetland vegetation would be lost permanently from levee construction and
- a substantial quantity of sensitive riparian and wetland vegetation would be initially removed from the channel during vegetation and sediment management activities and would be removed periodically during routine maintenance to preserve the "as built" channel condition.

Table 3-16. Summary of Impacts on Vegetation in the Lower Guadalupe River Project Area under the Channel Bank Modification Alternative

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	Extent of Impact by Project Reach							
	A	B	C	D	E	F	G	
Habitat Type	I-880 to U.S. 101	U.S. 101 to Trimble Road	Trimble Road to Montague Expressway	Montague Expressway to Hetch Hetchy Aqueduct Crossing	Hetch Hetchy Aqueduct Crossing to Tasman Road	Tasman Drive to SR 237	SR 237 to Union Pacific Railroad Bridge Crossing	Total
Terrestrial Habitats								
Riparian Forest (acres)								
Levee construction	0.04	0.02	0.47	0.60	0.03	0.04	0.00	1.20
Veg. management	–	–	–	–	–	–	–	–
Sediment management	–	0.57	0.10	0.04	0.03	–	–	0.74
Bridge transition zones	0.09	–	0.07	0.01	–	–	–	0.17
Riparian Scrub (acres)								
Levee construction	0.06	–	0.10	0.06	–	–	–	0.22
Veg. management	0.12	–	–	0.61	–	–	–	0.73
Sediment management	–	0.03	0.17	0.07	–	–	–	0.27
Bridge transition zones	–	–	–	–	–	–	–	–
SRA Cover (expressed in linear feet)								
Levee construction	–	–	–	–	–	–	–	–
Veg. management	–	–	–	–	–	–	–	–
Sediment management	–	–	44.00	–	–	–	–	44.00
Bridge transition zones	–	–	30.00 (feet)	30.00 (feet)	–	–	–	60.00 (feet)

Table 3-16. Continued

	Extent of Impact by Project Reach							
	A	B	C	D	E	F	G	
Habitat Type	I-880 to U.S. 101	U.S. 101 to Trimble Road	Trimble Road to Montague Expressway	Montague Expressway to Hetch Hetchy Aqueduct Crossing	Hetch Hetchy Aqueduct Crossing to Tasman Road	Tasman Drive to SR 237	SR 237 to Union Pacific Railroad Bridge Crossing	Total
Ruderal Scrub (acres)								
Levee construction	0.07	0.31	0.08	0.13	0.35	0.94	0.11	1.99
Veg. management	3.76	0.87	0.42	0.05	0.02	0.06	0.04	5.22
Sediment management	0.01	0.08	–	–	–	–	–	0.09
Bridge transition	0.12	–	0.01	–	–	–	–	0.13
Ruderal Herbaceous (acres)								
Levee construction	0.51	0.92	3.49	12.51	7.50	10.22	4.66	39.81
Veg. management	11.93	2.57	9.80	3.90	0.87	0.45	0.68	30.20
Sediment management	3.84	2.41	0.96	0.30	–	–	0.02	7.53
Bridge transition	0.32	0.09	0.06	0.11	0.07	0.04	0.05	0.74
Ornamental Landscaping (acres)								
Levee construction	0.02	0.02	0.16	0.33	0.07	0.85	0.06	1.51
Veg. management	0.97	–	0.40	–	–	–	–	1.37
Sediment management	–	0.02	–	–	–	–	–	0.02
Bridge transition	–	0.02	–	–	–	–	–	0.02
Aquatic Habitats								
Nontidal Freshwater Marsh (acres)								
Levee construction	0.05	0.03	0.04	–	–	–	–	0.12
Veg. management	2.39	0.16	1.90	–	–	–	–	4.45

Table 3-16. Continued

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	Extent of Impact by Project Reach							
	A	B	C	D	E	F	G	
Habitat Type	I-880 to U.S. 101	U.S. 101 to Trimble Road	Trimble Road to Montague Expressway	Montague Expressway to Hetch Hetchy Aqueduct Crossing	Hetch Hetchy Aqueduct Crossing to Tasman Road	Tasman Drive to SR 237	SR 237 to Union Pacific Railroad Bridge Crossing	Total
Sediment management	–	0.35	2.82	–	–	–	–	3.17
Bridge transition	0.11	0.12	0.08	–	–	–	–	0.31
Tidal Freshwater Marsh (acres)								
Levee construction	–	–	–	0.17	0.13	1.56	0.43	2.29
Veg. management	–	–	–	2.95	6.14	11.76	9.22	30.07
Sediment management	–	–	–	1.09	2.14	–	3.10	6.33
Bridge transition	–	–	–	0.04	0.31	0.56	1.99	2.90
Other Waters of the United States (acres)								
Levee construction	0.04	–	–	–	–	–	–	0.04
Veg. management	4.30	–	–	–	–	–	–	4.30
Sediment management	–	–	–	–	–	–	–	–
Bridge transition	0.36	–	–	–	–	–	–	0.36
Open Water (acres)								
Levee construction	0.01	–	0.05	0.01	–	0.78	0.05	0.90
Veg. management	1.11	–	0.06	0.09	–	–	–	1.26
Sediment management	–	–	0.13	0.10	–	–	–	0.23
Bridge transition	0.41	0.23	0.24	0.04	0.06	0.13	1.57	1.68

Implementation of Mitigation Measure V-1 would reduce this impact to a less-than-significant level because riparian and wetland vegetation that is removed would be replaced or compensated for according to an MMP.

The temporary effects on waters of the United States are considered less than significant because implementing this alternative would not result in substantial changes to the lower Guadalupe River's low-flow channel.

The loss of 34.7 hectares (85.7 acres) of ruderal vegetation from construction and maintenance activities under this alternative is considered less than significant because ruderal vegetation is not considered a sensitive natural community and is a common cover type in the LGRP area. In addition, the quantity and quality of ruderal vegetation temporarily removed under this alternative would be replaced by levee restoration activities, including erosion control activities, that would take place in the LGRP area.

Mitigation Measure V-1: Replace or Compensate for Loss of Riparian and Wetland Habitat

On-site and off-site mitigation for riparian habitat, SRA overhead cover vegetation, and wetland habitat affected under this alternative will take place in the same or similar locations, and using the same techniques, as those identified under the Proposed Project.

Impact: Potential for Loss of Riparian and Wetland Vegetation Resulting From Changes in Hydraulic Conditions

As discussed in the "Hydrologic and Hydraulic Conditions" section of this chapter, hydraulic conditions resulting from the Channel Bank Modification Alternative were assessed to determine the potential for increases in water velocities in the LGRP area. Hydraulic modeling indicated that there could be some effect on vegetation in the areas upstream and downstream of bridges, particularly Trimble Road and Montague Expressway. In addition, reach C would experience an increase in mean velocity over preproject conditions. Although there would be increases in water velocities around bridge crossings and in reach C, these increases are not expected to result in significant impacts on riparian and wetland vegetation, for the same reasons identified for the Proposed Project.

The LGRP proposes bridge transition zones in areas 100 feet upstream and downstream of all bridges. Vegetation management in these areas would include the removal of woody vegetation. Herbaceous vegetation would not be removed. Wetland vegetation, which would be removed within the channel if it poses a threat to channel capacity, is usually scoured by high-flow events on an annual or semiannual basis.

Although the Channel Bank Modification Alternative would increase the channel capacity and water velocities in portions of the LGRP area, the increase would not be appreciable, would represent a minimal increase over preproject conditions, and is considered less than significant. No mitigation is required.

Impact: Loss of Special-Status Species or Potential Habitat for Special-Status Species

Special-status plants that have the potential to occur in the LGRP area were identified from a list provided by USFWS (U.S. Fish and Wildlife Service 2001) and a CNDDB search performed in January 2001. A total of 8 listed species and 25 species of concern were identified as having the potential to occur in the LGRP area (appendix D). However, based on a review of the USFWS list, the CNDDB searches, and the other available information, none of these species have been observed or are expected to be found in the LGRP area because of a lack of suitable habitat. Potential impacts on special-status plant species downstream of the LGRP in the baylands study area would not occur for the same reasons identified for the Proposed Project. This potential impact is considered less than significant for the same reason identified for the Proposed Project. No mitigation is required.

Impact: Potential for Loss of Ornamental Vegetation from Construction and Vegetation and Sediment Management Activities

Under the Channel Bank Modification Alternative, there would be a loss of approximately 0.6 hectare (1.5 acres) of ornamental vegetation as a result of construction-related activities and 0.57 hectare (1.4 acres) as a result of sediment and vegetation management activities (table 3-16). Ornamental vegetation that would be affected by construction-related activities is located primarily along the ROW boundaries on the outboard side of the levee. Much of this vegetation is located on or adjacent to existing landscapes for surrounding commercial and residential developments. Ornamental vegetation that would be affected by vegetation management is located primarily along the levee banks on the inboard side of the levee.

The loss of ornamental vegetation is less than significant because ornamental vegetation is not considered a sensitive natural community. In addition, the quantity and quality of ornamental vegetation affected in the landscapes for surrounding commercial and residential developments would be fully replaced. No mitigation is required.

Alternative 4: Channel Bypass

Under the Channel Bypass Alternative, impacts on lower Guadalupe River riparian habitat would be slightly greater than under the Proposed Project because a larger construction zone would be required to build box culverts in both the east and west levees than to complete the Proposed Project. Impacts would be particularly severe in reach C, where riparian habitat that supports riparian wildlife species is located on the west bank in the channel. Assuming that this alternative could be constructed within approximately 3 m (10 feet) of the levee toes, impacts on SRA cover habitat would be only slightly greater than under the Proposed Project.

Construction impacts of this alternative on tidal and nontidal wetlands would be slightly greater than under the Proposed Project; culvert construction areas would encroach on wetlands in all reaches, and a level of initial and routine vegetation and sediment management similar to that of the Proposed Project would be needed. Similar to the Proposed Project, these channel modifications would have the greatest impact on nontidal and tidal freshwater habitats. Mitigation similar to that identified for the Proposed Project (Mitigation Measures V-1 and W-1) would be needed to reduce these wildlife impacts to acceptable levels.

There would be no impacts on special-status plant species in the LGRP area under this alternative for the same reasons identified for the Proposed Project and Channel Bank Modification Alternative; no special-status plant species are known to occur in the LGRP area, and the District would conduct preconstruction surveys to ensure that no special-status species would be affected by the project.

Downstream effects on marsh habitat from LGRP floodflows in Alviso Slough and adjacent areas would also be the same as for the Proposed Project and Channel Bank Modification Alternative; the LGRP design floodflow of 481 cms (17,000 cfs) would be the same for all of the alternatives, and the Channel Bypass Alternative would not increase flooding in Alviso Slough, or New Chicago Marsh. Increased flooding in Cargill Ponds A5, A7, A8D, and A8W would not result in substantial impacts on vegetation or special-status plants.

Baylands Mitigation Measure

The recommended Baylands Mitigation Measure, as identified in the "Hydrologic and Hydraulic Conditions" section of this chapter, would involve construction of an overflow weir on Alviso Slough to Pond A8W and a levee/floodwall along the perimeter of the town of Alviso. Temporary 1.42-cms (50-cfs) pumps would be used to evacuate floodwaters from Ponds A5, A7, A8D, and A8W; dual 1.42-cms pumps will also be required to evacuate floodwaters from Pond A6 (USFWS Refuge). While the predominant vegetation within Ponds A5, A7, A8D, and A8W consists of microalgae and very sparse distribution of pickleweed, Pond A6 has greater concentrations of diked salt marsh habitat along most of its perimeter. This includes the western inboard levee banks which are dominated by "peripheral" halophytic species such as saltgrass (*Distichlis spicata*), alkali heath (*Frankenia salina*), iceplant (*Mesembryanthemum* spp), and spearscale (*Atriplex triagularis*), among others, and a shelf area between the borrow ditch and the levee which is variably dominated by a mosaic of peripheral halophytes and salt marsh species such as common pickleweed (*Salicornia virginica*) and brass buttons (*Cotula coronipifolia*). The average shelf width is 15 feet and the levee bank rises another 15 feet diagonally above the shelf for a total average width of 30 feet. In addition, only approximately 85% of this slope is vegetated along its length. Approximately 1/3 of the levee banks surrounding the pond, from the western tip of the pond to the east end of the levee separating Ponds A6 and A5/A7, are mostly barren.

The center of Pond A6 is characterized by extensive salt panne and is surrounded by the water-filled borrow ditch. Various former tidal channels are present on the salt panne, and groundwater was observed to be within 1 foot of the surface. The elevation of the pond is 10 to 15 feet below the mean high water mark of the adjacent sloughs. The salt panne is only sparsely vegetated, mostly along the network of historic levees between the powerline catwalks in the northern end of the pond (the former duck club area) that are now significantly eroded. These areas are dominated by peripheral halophytes, but also harbor common pickleweed and other hydrophytes which form patches of diked salt marsh. Portions of the salt panne are also being colonized by annual pickleweed (*Salicornia europaea*).

Construction of these facilities could create physical impacts on several habitat types. The following is a summary of the impact analyses prepared for the recommended mitigation measures. ~~The full text of this report is~~

~~presented in appendix E.~~ Further details regarding the Baylands area are presented in appendix E.

Impact: Potential Loss of Habitat for Special-Status Plant Species

There is suitable habitat for 5 special-status plant species downstream of the LGRP area; however, all but 1 have been presumed absent in this area because there are not appropriate microhabitat requirements in or adjacent to Alviso Slough, existing distribution of these species is limited, or habitat in the impact area is of poor quality. The remaining species, Congdon's tarplant, has not been observed during recent years in the baylands study area, although it is known to occur in areas of Alviso that are removed from the marsh. This plant is well adapted to a wide range of disturbed environments, from tidally influenced ditches to seasonally wet agricultural fields where it is more common. Because this species is unlikely to occur in the impact area and adapts well in disturbed areas, the loss of small amounts of marsh or ruderal habitat from construction of an inlet weir and levee on Alviso Slough and temporarily increased floodflows under the Proposed Project is considered a less-than-significant impact. No mitigation is required.

Impact: Potential for Loss of Vegetation and Wetlands from Construction and Operation of the Baylands Mitigation Measure

Pond A6

Based on an assessment of aerial photos, approximately 1.9 mile of the levee slope and shelf along Pond A6 is variably vegetated (up to 85%) with diked salt marsh vegetation and peripheral halophytes. Under the Proposed Project, Pond A6 is expected to flood up to 2 feet above the base elevation (i.e., the level of the salt panne); this will inundate the shelf areas up to their total average width of 15 feet to a depth of 2 feet. Portions of the toe of the levee bank may also be inundated as elevation permits. This flooding scenario is expected to inundate approximately 30% of the vegetation on the inboard side of the levee, which is estimated to be 3 acres. An additional 0.5 acre of peripheral halophytes is estimated to occur on the salt panne, for a total of approximately 3.5 acres of vegetation to be inundated under the Proposed Project. Inundation of the vegetation for prolonged periods could cause vegetation to die off, reducing the total potential habitat available for the salt marsh harvest mouse for several years. Pickleweed, the most important component plant species for the salt marsh harvest mouse, can tolerate extensive inundation, particularly in the nongrowing season (winter).

However, several months of flood could cause a loss of that species and consequently have a significant impact on the salt marsh harvest mouse. Implementation of Mitigation Measure HH-3 would reduce this impact to a less-than-significant level.

In addition to the impacts associated with inundating the diked salt marsh in Pond A6, portions (approximately 2.5 acres) of the levee separating Pond A6 from Ponds A5 and A7 will be armored with cellular concrete mattresses. Based on a review of aerial photos depicting the areas to be submerged by the design event, an estimated 0.6 acres of potential Section 404 jurisdictional "Other Waters" will be armored in preparation for inundation under the Proposed Project. No portion of this armoring will impact potential wetlands, as there is virtually no salt marsh vegetation along this levee. Since portions of the levee lie within Corps jurisdiction, permits may be required before construction occurs.

Diked salt marsh vegetation is relatively common within the Baylands, and temporary impacts due to flooding this habitat within Pond A6 are considered less than significant. However, minor flooding in this pond would require temporary pumps to be operated to minimize potential effects on biological resources such as the salt marsh harvest mouse. Mitigation Measure HH-3 is defined to expand use of temporary pumps on Pond A6 to evacuate flood waters in a timely manner. With Mitigation Measure HH-3, the hydrologic effect on Pond A6 would be reduced to a less-than-significant level.

Alviso Levee

Construction of portions of the proposed Alviso levee improvements would take place in an area that has been recently upgraded (1990s). Other areas of the levee would be located in an existing parking lot and along an existing access road. The design and footprint of the levee to protect Alviso assumes that all of these improvements could be accomplished without affecting any wetlands, and that the levee raising work would be implemented in the existing top-of-levee area. The proposed levee would be located on 6,100 square meters (m^2) (1.5 acres) of existing levee and approximately 59,500 m^2 (2.45 acres) of upland and ruderal vegetation. Loss of these common vegetation types in the area of an existing levee is considered a less-than-significant impact because the vegetation that is lost is a common cover type in the baylands and is not considered to be a sensitive natural community. No further mitigation is required.

Vegetation Management Activities

The vegetation management activities and the construction of a maintenance access road proposed immediately downstream of the UPRR bridge would affect an area of approximately 15,985 m^2 (1.60 hectares [3.95 acres]). The combined actions are expected to affect tidal freshwater and brackish marsh habitat and ruderal habitat resulting from the removal of vegetation, herbicide application, and construction of a maintenance road. Approximately 12,580 m^2 (3.12 acres) of marsh habitat would be affected by herbicide application and 1,800 m^2 (0.45 acre) would be affected by vegetation removal. In addition, construction of a new maintenance road would result in discharge of dredge or fill material into approximately 1,200 m^2 (0.3 acre) of jurisdictional wetland. Impacts on wetland vegetation in these areas are considered significant. To reduce these mitigation measure impacts to a less-than-significant level, the District would compensate for or replace lost wetland vegetation as indicated in Mitigation Measure V-2 below.

Overflow Weir

The installation of the Alviso Slough overflow weir in the Cargill levee would have an estimated footprint of 1.75 hectare (4.3 acres) ~~7,020 m^2 (75,535 square feet, or 0.7 hectare [1.73 acres])~~, not including areas of temporary impact. Construction of the weir is expected to permanently affect tidal marsh habitats along Alviso Slough (primarily brackish marsh), aquatic habitat of Pond A8W, a small amount of salt marsh and peripheral halophytes along Pond A8W's perimeter, and ruderal habitat on the levees separating the 2 areas. Impacts include ~~the loss of~~ effects on 1.0 hectare (2.46 acres) ~~800 m^2 (0.2 acre)~~ of aquatic habitat that falls within the weir footprint and loss of 520 m^2 (0.13 acre) of marsh habitat. Impacts on vegetation in these areas are considered significant because these habitat types are considered sensitive natural communities and are increasingly rare in the south bay region. The sensitive nature of these habitats, as well as their jurisdictional status, would require additional mitigation. To reduce the impacts of the Baylands Mitigation Measure on vegetation to a less-than-significant level, the following measure will be incorporated into the Baylands Mitigation Measure to ensure that this LGRP mitigation measure does not result in additional significant impacts. The implementation of the following measure combined to mitigate for impacts on areas of both Corps and DFG jurisdiction would reduce these potential vegetation losses to a less-than-significant impact.

Mitigation Measure V-2: Additional Replacement or Compensation for Loss of Riparian and Wetland Habitat

To ensure that significant loss of vegetation from mitigation measures recommended for the Proposed Project is mitigated to a less-than-significant level, the District will replace or compensate for wetland habitat lost from constructing an inlet weir and maintenance road and removing vegetation under the Baylands Mitigation Measure. Mitigation Measure V-2 will therefore include additional replacement of up to 1.62 hectares (4.0 acres) of wetland habitat at a 1:1 ratio in the District's Pond A4 mitigation site.

Impact: Potential for Impacts on Ruderal Habitats

Impacts on ruderal habitats could result from construction of the Alviso Slough overflow weir improvement of the levee around the town of Alviso, and vegetation management. The extent of these impacts, and temporary or permanent nature of the impacts, will not be known until a more specific design has been developed. The loss of ruderal habitat, whether permanent or temporary, is considered less than significant because ruderal habitats are common in the area. No mitigation is required.

Wildlife

The LGRP area contains a mosaic of habitats, including wetlands, riparian, and uplands, that support several wildlife species. Habitat types are described in the "Vegetation" section of this chapter, and table 3-13 summarizes the acreage of the existing habitat types by reach. Riparian habitat in the LGRP area is particularly important for wildlife in the Santa Clara Valley because the habitat

- provides refuge for wildlife species in an urban environment;
- supports migratory neotropical songbirds not found in adjacent areas;
- provides a movement corridor for such wildlife as small mammals, amphibians, and resident birds between San Francisco Bay, the valley floor, and foothill habitats;
- adds to the total amount of habitat in the local environment with value to wildlife; and
- contributes to maintaining a wide range of wildlife species in adjacent habitats, including urban areas.

Wildlife observed or expected to occur in the LGRP area are listed in table D-2 in appendix D.

Most of the riparian corridor in the LGRP area has been substantially disturbed, habitat corridors are discontinuous, and the floodplain is constrained by levees and adjacent land uses. The lands surrounding the river have been developed into residential, commercial, and light industrial areas with a limited amount of undeveloped land parcels that provide little habitat for wildlife.

Riparian Wildlife Species

Riparian habitats are considered to be among the most productive habitats for wildlife in California, and riparian forests support the most dense and diverse wildlife communities in the Santa Clara Valley. Riparian habitats often contain special ecological features that are not found in upland areas (Brinson et al. 1981). In addition, riparian corridors function as important pathways for wildlife movement. DFG has designated riparian corridors as habitat of special concern in California because of their high value to wildlife and their limited distribution. The availability of water, diversity and abundance of plant life, and complex vegetation structure provide a variety of wildlife species with food and cover as well as breeding and resting sites. The abundance of wildlife species is generally greater in riparian habitats than in adjacent habitats because of the juxtaposition of aquatic and terrestrial habitats and the high proportion of habitat edge.

Riparian habitats in the LGRP area are generally narrow and fragmented by maintenance operations, bridge crossings, and District maintenance roads. Riparian habitats are also constrained by bordering land uses and levee roads. In the uppermost reaches (i.e., reaches A and B), habitat is sparse and fragmented, consisting of small stands of trees or single trees, shrubs, and riparian vegetation. Riparian vegetation in reaches A and B provides a relatively small amount of SRA overhead cover vegetation. Reach C has the most valuable riparian forest habitat in the LGRP area. The diversity of vegetation species and age classes within reach C creates a more complex habitat for wildlife species. In addition, reach C has the highest quantity of SRA cover vegetation in the LGRP area. In reach D, the riparian habitat slowly transitions to freshwater marsh habitat, with sparse willow patches. Reach E is primarily dominated by tidal freshwater marsh. There is no riparian habitat on the inboard side of the levee in reaches F and G. There is a small, isolated patch of riparian vegetation on the outboard side of the levee on the west side of the part of reach F located farthest upstream.

Riparian habitat supports abundant aquatic and terrestrial invertebrates that are prey for amphibians, reptiles, small mammals, and insectivorous birds. Wildlife typically frequents the habitat edges between riparian vegetation and adjacent habitats. Urban streams such as the lower Guadalupe River typically support few amphibian and reptile species because urbanization has reduced habitat values. Common amphibian species in the LGRP area include Pacific chorus frog (*Hyla regilla*), western toad (*Bufo boreas*), and bullfrog (*Rana catesbeiana*).

Mammals that inhabit the LGRP area do not require a continuous corridor from one habitat area to another, require only small home ranges, and are tolerant of human activity and urbanization. These mammals include Virginia opossum (*Didelphis virginiana*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), Trowbridge shrew (*Sorex trowbridgii*), broad-footed mole (*Scapanus latimanus*), fox squirrel (*Sciurus niger*), Botta's pocket gopher (*Thomomys bottae*), and feral cat (*Felis domesticus*). Mammals that require large home ranges and migration corridors, such as the bobcat (*Lynx rufus*), mountain lion (*Felis concolor*), coyote (*Canis latrans*), and mule deer (*Odocoileus hemionus*), may be eliminated from these lower reaches.

Riparian habitat is very important for nesting and migrating songbirds. Bird species occupying and nesting in the LGRP area include mourning dove (*Zenaida macroura*), belted kingfisher (*Ceryle alcyon*), red-shouldered hawk (*Buteo lineatus*), and various songbirds such as black phoebe *(Sayornis nigricans*), yellow warbler (*Dendroica petechia*), yellow-rumped warbler (*Dendroica coronata*), house finch (*Carpodacus mexicanus*), lesser goldfinch (*Carduelis psaltria*), and California towhee (*Pipilo maculatus*).

Wetland Wildlife Species

Wetland habitats are considered to be among the most productive habitats for wildlife in California. A variety of factors—urban pollution, small habitat patch sizes, habitat fragmentation, and habitat loss—reduce the wildlife value of freshwater marsh and aquatic habitat in the LGRP area. There is nontidal freshwater marsh in reaches A–C and tidal freshwater marsh in reach D.

In reaches A and B, wetlands are typically isolated, narrow, linear patches that are found in or adjacent to the low-flow channel or on the adjacent low terraces. In reach C, wetland habitats are found along the edges of the river channel, on instream bars, and in portions of the flood bypass channel on the east side of the reach. Wetlands in reach C are typically more continuous, linear patches that are wider than those found in reaches A and B. There is tidal freshwater marsh in reaches D–G along the river channel and on adjacent tidally influenced floodplains. Wetlands in these reaches are the dominant cover type between the inboard toe of the levees and are found along both sides of the river. These habitats are important to wading birds such as herons and egrets, and other birds such as rails, marsh wrens (*Cistothorus palustris*), sparrows, and common yellowthroats (*Geothlypis trichas*).

Wildlife species known to occur in marsh and aquatic habitats in the LGRP area include western toad, bullfrog, Pacific chorus frog, western aquatic garter snake (*Thamnophis couchi*), great blue heron (*Ardea herodias*), great egret (*Ardea alba*), green~~-backed~~ heron (*Butorides virescens*), black-crowned night heron (*Nycticorax nycticorax*), mallard (*Anas platyrhynchos*), belted kingfisher, black phoebe, song sparrow (*Melospiza melodia*), and common yellowthroat.

Upland Wildlife Species

Upland habitats, identified as ruderal scrub and ruderal herbaceous cover types in the LGRP area, are the most common habitat type in each of the project reaches. By themselves, upland habitats provide less diverse wildlife habitat compared to riparian and wetland habitats; however, upland habitats ~~that are~~ adjacent to riparian and wetland habitats provide important habitat edges that, in turn, provide foraging and escape habitat for riparian and wetland wildlife species. Upland habitats provide foraging habitat for many riparian and wetland species, as well as upland species such as small mammals, songbirds, burrowing owls (*Athene cunicularia*), and raptors.

Upland habitats within the LGRP area are typically linear and infrequently fragmented by other habitat types, bridge crossings, and District maintenance roads. Similar to riparian habitats, upland habitats are constrained by bordering land uses and levee roads. In the LGRP area, upland habitats are typically found on the outboard and inboard sides of the levees and on portions of the floodplain. In reaches A and B, upland habitat is the dominant cover type on the levees and floodplains. Upland habitat in reach C is primarily found on the levee banks, in the upper portions of the flood bypass channel, and in openings in the riparian canopy. In reach D, upland habitat is the dominant cover type on the levees and on portions of the floodplain. In reaches E–G, upland habitat is located primarily on the levee banks.

Special-Status Species

Special-status wildlife species are defined as species that are legally protected under the federal and California ESAs. Special-status wildlife are species that are

- listed or proposed for listing as threatened or endangered under the federal ESA (50 CFR 17.11 [listed wildlife], and various notices in the *Federal Register* [proposed species]);
- proposed to be or are candidates for possible future listing as threatened or endangered under the federal ESA (62 FR 182:49397–49411, September 19, 1997);
- listed or proposed for listing by the State of California as threatened or endangered under the California ESA (14 CCR 670.5);
- species of concern, as identified in the species list provided by USFWS (U.S. Fish and Wildlife Service 2001), that have the potential to occur in

the project area because suitable or marginal habitat may exist for those species; and

- identified as species of concern by the State of California under the California ESA that have the potential to occur in the project area because suitable or marginal habitat may exist for those species.

Special-status wildlife species that have the potential to occur in the LGRP area were identified from a list provided by USFWS in January 2001 and a CNDDB search performed in January 2001. A total of 15 listed species, 1 proposed species, 1 candidate species, and 52 species of concern have the potential to occur in the LGRP area, as well as in Santa Clara County (table D-2 in appendix D).

The CNDDB search included all USGS quadrangle maps in which the LGRP area is located (i.e., San Jose West and Milpitas 7.5-minute USGS quadrangle maps) (California Natural Diversity Database 2001). The CNDDB species list contained 5 listed species, 1 candidate species, and 5 state-listed species of concern (table D-2). Another species of concern in the region, which was not identified in the CNDDB search but is present in the Guadalupe River watershed, is the southwestern pond turtle (*Clemmys marmorata pallida*) (table D-2).

Of the species identified in table D-2 (appendix D), only 5 listed species and 4 species of concern either occur or have the potential to occur in the LGRP area or immediately downstream of the LGRP area. The listed species are California clapper rail (*Rallus longinostris obsoletus*), western snowy plover (*Charadrius alexandrinus nivosus*), California red-legged frog (*Rana aurora draytonii*), California least tern (*Sterna antillarum [=albifrons] browni*), and salt marsh harvest mouse (*Reithrodontomys raviventris*). Of these listed species, only clapper rails have been observed in the LGRP. Clapper rails are occasionally seen and heard along the lower reaches of the Guadalupe River upstream and downstream of the Gold Street bridge (Bousman pers. comm.). Clapper rails are known to breed downstream of the Proposed Project.

The species of concern are saltmarsh common yellowthroat (*Geothlypis trichas sinuosa*), Alameda song sparrow (*Melospiza melodia pusillula*), burrowing owl, and southwestern pond turtle. Common yellowthroats and song sparrows have been identified in the LGRP area; however, because the various subspecies are difficult to distinguish in the field, it is unknown whether the individuals observed were the saltmarsh common yellowthroat and the Alameda song sparrow, both of which occur dowstream of the Alviso area, or other subspecies.

Formal surveys have not been performed specifically in the area downstream and outside of the LGRP limits; however, some special-status species surveys have been conducted for some of these species, as discussed below under the individual species accounts. Please refer to appendix E for a detailed discussion of special-status species that are known to occur downstream of the LGRP in the baylands study area.

California Clapper Rail

The California clapper rail is listed under the California and federal ESAs as endangered. No critical habitat of this species has been designated. The California clapper rail occupies a distinct habitat in the baylands downstream of the LGRP area. This species breeds in salt and brackish marshes along the edge of San Francisco Bay. It is most abundant in multichanneled salt marshes dominated by California cordgrass (*Spartina foliosa*), pickleweed (*Salicornia virginica*), and marsh gumplant (*Grindelia stricta*). California clapper rails breed from mid-March through July; breeding peaks in May and June.

Distribution

The California clapper rail is a subspecies of clapper rail that is limited to the San Francisco Bay Area and its surrounding coastal areas south to Morro Bay.

Endangerment

The California clapper rail is listed as endangered because of declining populations and the loss and fragmentation of quality habitat in California. Before the Migratory Bird Treaty Act in 1913, clapper rails were overhunted to near extinction. By 1940, populations had recovered, but they were threatened again as a result of habitat destruction. Expanding development to accommodate business and residential properties has led to the destruction of thousands of acres of San Francisco Bay Area marshland. Only 21% of the original 76,893 hectares (190,000 acres) of marshland along San Francisco Bay remain today, and much of this area is highly fragmented or altered (Goals Project 1999). The most recent declines in the California clapper rail have resulted from the increase of introduced predators such as the red fox (*Vulpes vulpes*) and Norway rat (*Rattus norvegicus*). The increase in heavy metal contaminants from mines in the headwaters and wastewater effluent has risen to near-toxic levels. Rail eggs have been found to harbor elevated levels of mercury, selenium, and other contaminants, probably because sewage effluent, industrial discharges, and urban runoff have contaminated the bird's food supply (H. T. Harvey & Associates 1989).

Occurrence in the Guadalupe River Watershed

District biologists conducted clapper rail surveys in the LGRP area from SR 237 to the Alviso Marina boat ramp in 1996 and 1997 (Santa Clara Valley Water District 1996a, 1997a). No rails were observed within this portion of the river, which includes reach G. Clapper rails are occasionally seen and heard along the lower reaches of the Guadalupe upstream and downstream of the Gold Street bridge (Bousman pers comm.). Habitat in this reach is considered marginal because it is composed of narrow, linear bands of vegetation and does not provide the optimal cover types preferred by the clapper rail. Nonprotocol-level surveys were performed by Jones & Stokes biologists within the lower reaches of the planning area in March 2000. No clapper rails were observed during the surveys.

Western Snowy Plover

The coastal subspecies of western snowy plover is federally listed as threatened and state listed as a species of special concern. The inland subspecies is not federally listed but is a state species of special concern. Critical habitat was designated for the snowy plover on December 7, 1999; 19 areas along the coast were listed as critical-habitat areas (64 FR 234:68508–68544, December 7, 1999). No critical habitat was designated for Santa Clara County, where the LGRP would be constructed.

Distribution

The coastal population of the western snowy plover is found along the California coast and its bays from Del Norte County to San Diego County; the species is a year-round resident in the San Francisco Bay Area. Its breeding season is from mid-March through July, with peaks observed from early May through late June. The snowy plover has historically nested primarily on sandy coastal beaches and on the margins of alkali lakes and playas in inland areas. It is not known whether this species nested in San Francisco Bay before the conversion of salt marsh to salt evaporation ponds.

Endangerment

Snowy plover populations have declined as a result of loss of nesting habitat, human disturbance at nesting sites, and predation.

Occurrence in the Guadalupe River Watershed

Although the salt ponds located downstream of the LGRP area have provided suitable nesting and foraging habitat for western snowy plovers since the beginning of the 20th century (Grinnell et al. 1918), there is no suitable nesting or foraging habitat for snowy plovers in the LGRP area. However, snowy plovers are known to breed downstream of the Proposed Project in nearby salt ponds, and ~~A~~about 10% of the California population of snowy plovers currently breeds in San Francisco Bay salt ponds, mostly in the southern part of the bay (Page and Stenzel 1981, Page et al. 1991).

Salt Marsh Harvest Mouse

The salt marsh harvest mouse is federally and state listed as endangered. The salt marsh harvest mouse is found only in saline wetlands of San Francisco Bay and its tributaries. It occurs primarily in pickleweed marshes and moves to adjacent uplands during high tides. Pickleweed is the primary habitat, but nonsubmerged, salt-tolerant vegetation is essential for escape during highest tides. Habitat value increases as the pickleweed density increases and is interspersed with fat hen and alkali heath (Shellhammer et al. 1982). Pickleweed and saltgrass are the main sources of food for the salt marsh harvest mouse. This species is capable of drinking saltwater.

Distribution

The southern subspecies is restricted to an area from San Mateo County and Alameda County along both sides of San Francisco Bay south to Santa Clara County.

Endangerment

This species has declined substantially in recent decades. This decline has occurred primarily because of diking and filling of marshes, subsidence, and the reduction of pickleweed stands (which resulted when increasing volumes of fresh water discharged into the bay changed the bay's salinity).

Occurrence in the Guadalupe River Watershed

Salt marsh harvest mice are known to occur downstream of the Proposed Project in the baylands near the town of Alviso, in New Chicago Marsh and other diked salt marshes in the vicinity. In 1990, H. T. Harvey & Associates completed a small-mammal trapping survey that documented salt marsh harvest mouse observations in Triangle Marsh and the Calaveras Point Marsh (appendix E).

The District performed small-mammal trapping surveys in 1996 in reaches C–G. No salt marsh harvest mice were captured or observed during the surveys (Santa Clara Valley Water District 1996b). There is no suitable habitat in the project area for salt marsh harvest mouse because the lower reaches of the river are considered tidal freshwater marsh and are not dominated by the plant species preferred by salt marsh harvest mice.

California Red-Legged Frog

The California red-legged frog is federally listed as threatened and is a state species of special concern (61 FR 101:25813–25833, May 23, 1996). Critical habitat was designated for the California red-legged frog on March 13, 2001; 28 counties in California, including Santa Clara County (66 FR 49:14625–14674, March 13, 2001). The red-legged frog occupies a fairly distinct habitat, combining both specific aquatic and riparian components. The adult red-legged frog requires dense or shrubby riparian or emergent vegetation, such as cattail and tule marsh, that is closely associated with water that is both deep (more than 2 feet) and either still or slow-moving. The highest densities of red-legged frogs are associated with deepwater pools with dense stands of overhanging willow and an intermixed fringe of emergent vegetation. Emergent vegetation is important for breeding; the female deposits egg masses on vertical stems of emergent vegetation so that the egg masses float on the surface of the water (Hayes and Miyamoto 1984). The breeding season is in the rainy months, usually from November through March (Stebbins 1985).

Habitat necessary for estivation (reduced activity during late summer and early fall) is essential for the survival of red-legged frogs in a watershed. Red-legged frogs estivate in small-mammal burrows and moist leaf litter (Jennings and Hayes 1985). Red-legged frogs have been found up to 100 feet from water in adjacent dense riparian vegetation for as many as 77 days (Rathbun et al. 1993). In coastal areas, the use of the adjacent riparian corridor was most often associated with drying of coastal creeks in mid- to late summer (Rathbun et al. 1993). Although red-legged frogs typically remain near streams or ponds, unpublished information indicates that they are capable of moving 1 mile or more in upland habitat or through ephemeral drainages (Westphal pers. comm.). The availability of estivation habitat, and the ability to access such habitat, may be a limiting factor in population numbers and survival.

Distribution

Historically, red-legged frogs ranged from northern California to Baja California and west of the Cascade-Sierra crest. This range includes the Guadalupe River watershed. Red-legged frogs inhabit elevations from sea level to 5,000 feet (Jennings and Hayes 1994). The red-legged frog's habitat once included parts of California's Central Valley, the Coast Range, and the Sierra Nevada foothills, but the frog now appears to be absent from the Central Valley and to occur in only isolated areas in the Coast Range and the Sierra Nevada foothills.

Endangerment

In the late 1800s and early 1900s, the red-legged frog was marketed heavily as a source of frog legs for human consumption. Consequently, breeding in the early 1900s was reduced to the point where populations of red-legged frog became too minimal to record. Introduction of the bullfrog (*Rana catesbeiana*) to California as an additional source of frog legs added to the decline of the red-legged frog population because of competition and predation (Jennings and Hayes 1985). The red-legged frog currently faces habitat loss, habitat alteration, and competition with nonnative predators, such as bullfrog, largemouth bass (*Micropterus salmoides*), and green sunfish (*Lepomis cyanellus*). The most secure populations of red-legged frogs are found in aquatic sites that support substantial riparian and aquatic vegetation and lack nonnative predators. The final rule for the federal listing of the red-legged frog states that red-legged frogs generally are extirpated from downstream portions of a drainage 1–5 years after filling a reservoir, depending on the size of the drainage (61 FR 25813–25833, May 23, 1996). In larger drainages, isolated populations can persist upstream.

Occurrence in the Guadalupe River Watershed

A number of red-legged frogs were observed in the Guadalupe River watershed from 1904 to 1997 (see appendix G). These observations represent museum collection and university records (1904–1983), as well as unpublished DFG records. Observations were made before 1980, but no specific dates were provided. In 1997, H. T. Harvey & Associates prepared a countywide report on red-legged frog occurrence in Santa Clara County, including the Guadalupe River watershed. This report indicated that there are no extant red-legged frog populations in the LGRP area (H. T. Harvey & Associates 1997a).

In 1996 and 1997, the District conducted surveys for the California red-legged frog. The District determined that there was potential suitable habitat within the lower Guadalupe River planning area; however, no red-legged frogs were observed during the surveys (Santa Clara Valley Water District 1997b). Although there may be potential habitat in the project reaches, it is believed that the red-legged frog is absent from the LGRP area because of the presence of predators such as bullfrogs, largemouth bass, and green sunfish.

Saltmarsh Common Yellowthroat

The saltmarsh common yellowthroat, a subspecies of the common yellowthroat, is federally listed as a species of concern. The saltmarsh common yellowthroat inhabits areas of emergent vegetation and breeds in fresh and brackish marshes in the San Francisco Bay Area, occasionally breeding upslope of these areas. This subspecies breeds from mid-March through early August, and pairs frequently raise 2 clutches per year. Female yellowthroats construct tight cup nests of grasses and sedges lashed firmly to surrounding vegetation and covered by loosely woven grasses (Hobson et al. 1986).

Distribution

Saltmarsh common yellowthroats occur from Marin County south to the Santa Clara-Santa Cruz County line. Individuals cannot be reliably distinguished from common yellowthroats in the field without capture. Only by observing nesting can this subspecies be determined; it is the only yellowthroat subspecies known to breed in the marsh habitat in the planning area (H. T. Harvey & Associates 1999).

Endangerment

This species is currently listed as a species of concern because of the loss and fragmentation of habitat in the San Francisco Bay Area. Only 21% of the original 76,893 hectares (190,000 acres) of marshland along San Francisco Bay remain today, and much of this area is highly fragmented or altered (Goals Project 1999). Tidal marshlands have been reduced greatly by filling, dredging, and diking. Remaining habitat is extremely fragmented and separated by severely degraded habitat, making dispersal and migration problematic.

Occurrence in the Guadalupe River Watershed

Saltmarsh common yellowthroats breed in the emergent vegetation in the tidal freshwater marsh along the Guadalupe River and San Tomas Aquino Creek. The species has been observed within the planning area. Surveys done during the 2000 breeding season revealed several pairs using habitat within the lower reaches of the lower Guadalupe River. San Francisco Bay Bird Observatory biologists and volunteers conducted a census of breeding saltmarsh common yellowthroats in 1985. They observed 1 individual in Alviso Slough near the town of Alviso. Their surveys did not continue upstream of the UPRR bridge, but continued downstream for approximately 1 km. No pairs were observed (Hobson et al. 1986). Jones & Stokes biologists observed ~~saltmarsh~~ common yellowthroats in the marsh habitat south of the UPRR bridge and in the vicinity of the Alviso Marina during reconnaissance-level surveys in March 2000, although the subspecific identity of these birds is unknown.

Western Burrowing Owl

The western burrowing owl (*Athene cunicularia hypugea*) is a federal species of concern. This species is a small, terrestrial owl of open country typically found in flat open grassland, ruderal fields, large urban lots, or sparsely vegetated ecosystems. Burrowing owls are sometimes colonial nesters, using abandoned ground-squirrel burrows. Regional and local populations depend on ground squirrel populations. In the absence of ground squirrels, habitat usually becomes unsuitable for burrowing owls. These owls use burrows during the breeding season (February–September) for nesting and during the nonbreeding season (October–January) for cover.

Distribution

Historically, the burrowing owl was common throughout lowland California; however, a decline first noticed in the 1940s has continued to today (Grinnell and Miller 1944, Remsen 1978, DeSante and Ruhlen 1995). In the Bay Area and the central portion of the Central Valley (from Yolo County south to Merced County), the burrowing owl population has declined by 65% since 1986 (DeSante and Ruhlen 1995).

Endangerment

The population of burrowing owls has declined primarily because of pesticide use, rodent-control programs, and habitat loss and degradation from development (Remsen 1978). The burrowing owl's ground-oriented behavior, especially that of fledglings, makes the species vulnerable to being hit by cars, disturbed during road and levee maintenance operations, and generally harassed by domestic pets and pedestrians (Remsen 1978). Burrowing owls are also affected adversely when ground squirrels and other burrowing mammals on which they depend for burrows disappear.

Occurrence in the Guadalupe River Watershed

Numerous protocol-level and reconnaissance-level surveys for burrowing owls have been conducted in the Guadalupe River watershed using DFG procedures. Protocol-level surveys are more formal and rigorous than reconnaissance-level surveys. During 1986 and 1987 surveys, a resident pair of burrowing owls was present along the banks of the upper portions of the Guadalupe River (i.e., reach 12, between Branham Lane and Almaden Expressway). Burrowing owls have been observed within the town limits of Alviso and in the surrounding areas, both within the city landscape and in the grassland habitats. In recent years, several pairs located south of SR 237 have been displaced because of land development. In 1995, surveys were conducted for burrowing owls during the breeding season along reach A. No individuals were observed during these surveys. Reach A provides potential (low- to moderate-quality) burrowing owl habitat.

Southwestern Pond Turtle

The southwestern pond turtle (a subspecies of the western pond turtle) is a federal species of concern and a state species of special concern. The western pond turtle, including both the northwestern and southwestern subspecies, was petitioned for federal listing on January 15, 1992 (Holland 1991). On August 11, 1993, USFWS announced that the western pond turtle did not meet the requirements for listing as an endangered or a threatened species, but that the petition could be revised and resubmitted in the future (58 FR 153:42717–42718, August 11, 1993).

The Western pond turtle includes 2 described subspecies. Both subspecies, which are difficult to distinguish in the field, are known to occur in the San Francisco Bay region. The northwestern subspecies occurs from the Sacramento Valley and coastal drainages of California northward from the San Francisco Bay Area; the southwestern subspecies occurs from Monterey Bay south in the coastal region to Baja California. The south San Francisco Bay area and the San Joaquin Valley are described as a zone of intergradation between the 2 subspecies. Southwestern pond turtles are not known to breed within the LGRP area.

This species is a riparian species known to nest as many as 500 m (1,640 feet) from water, digging small nests in dry soil. They are commonly found in still or slow-moving streams, ponds, and lakes. The pond turtle has occurred historically along the Guadalupe River; however, urban development and nonnative predators (bullfrogs, dogs, and nonnative fish) reduce or limit local pond turtle populations. This species is unlikely to occur in the tidal portions of the Guadalupe River because of the absence of sheltered lagoons where turtles could be protected from tidal surges.

Pond turtles lay their eggs in upland areas, such as scrub, grassland, and savanna habitats, during spring months. Ponds and slow-moving streams provide suitable rearing and foraging habitat and cover for pond turtles. Hatchling pond turtles require shallow water with little or no current and emergent vegetation for cover. Pond turtles are a slow-growing species that can live to be more than 40 years old.

Distribution

The southwestern pond turtle occurs from the Bay Area south to Baja California west of the Sierra Crest up to 1,829 m (6,000 feet). It is absent from desert regions except the Mojave, where it is found along the Mojave River and its tributaries. Historically, pond turtles have been found in the Guadalupe River watershed.

Endangerment

Populations of pond turtles have declined because of the loss of and degradation to wetlands, streams, and adjacent upland habitats. In urban areas, water pollution and storm runoff reduce habitat quality for turtles. Urban development also reduces the quality and quantity of upland nesting habitat. Nonnative predators, such as bullfrogs, domestic animals, and nonnative fish, can also reduce or limit local populations of pond turtles.

Occurrence in the Guadalupe River Watershed

The Guadalupe River in the study area is considered poor-quality aquatic and upland habitat for the pond turtle. Much of the land adjacent to the Guadalupe River has been developed, and some of the little remaining open space is intensively farmed. These activities have eliminated most of the potential upland nesting areas for pond turtles along the riverbanks. There are potential low-quality nesting spots along undeveloped areas of the river's edge on the outside of levees in isolated parcels adjacent to the LGRP area.

Previous flood protection projects, including reservoirs and bank stabilization, also have reduced the quality of pond turtle habitat along the Guadalupe River. These projects have eliminated or altered the distribution and quality of pools used by pond turtles. Basking sites also appear to be limited along the river and its tributaries, possibly because of previous flood protection projects. Nonnative, invasive plant species are common along the Guadalupe River and further reduce habitat quality for pond turtles

The presence of bullfrogs, nonnative predatory fish, and other predatory animals (e.g., striped skunks, opossums, raccoons, herons, and dogs) increases the level of predation on turtle eggs and young turtles along the Guadalupe River and its tributaries. Competitors such as the red-eared slider (*Chrysemys scripta*) are also found in the area. A red-eared slider was observed in reach A during 1997 surveys (Santa Clara Valley Water District 1997b). Water pollution and storm runoff, as well as the proximity of urban development to the river, also reduce habitat quality for pond turtles. Despite these factors, a small number of pond turtles appear to exist along the Guadalupe River and its tributaries. Individual pond turtles could migrate into the study area from upstream areas.

California Least Tern

The California least tern is federally and state-listed as endangered. No critical habitat has been designated. California least terns are colonial nesters that breed in the Bay Area, as well as coastal areas in central and southern California. The species breeds from late April though July. Nest sites tend to be in open areas above high water levels and safe from predation. Sand is the dominant substrate used for their shallow scrape nests; however, they also use sandy areas with sparse vegetation, mudflats, and gravel substrates. They forage on adjacent surf line, estuaries, or the open ocean.

Distribution

The California least tern is a subspecies of least tern that is limited to the Bay Area and the southern California coast from southern San Luis Obispo County south to San Diego County. This species winters along the Pacific coast of Central America.

Endangerment

Populations of California least tern have been declining because of loss of habitat caused by

- shoreline development,
- predation by native and feral animals,
- dredging and filling activities,
- water pollution of estuarine and offshore foraging areas, and
- disturbance of suitable nesting sites by human activities.

Occurrence in the Guadalupe River Watershed

Neither the LGRP area nor the Cargill salt ponds, downstream of the LGRP, provide suitable breeding ~~nesting~~ habitat for California least terns. The primary postbreeding (fall) staging area of the California least tern in the south bay is in the complex of ponds immediately north of Moffett Field, which is located west of the LGRP area. California least terns, however, may occasionally forage in Cargill salt ponds A3, A5, and A7 and have been observed by amateur birdwatchers foraging in the baylands. The lower reaches of the LGRP area may also provide marginal foraging habitat for this species; however, no occurrences have been recorded in the LGRP area.

Alameda Song Sparrow

The Alameda song sparrow, a subspecies of the song sparrow, is state-listed as a species of concern. The Alameda song sparrow is 1 of 3 song sparrow subspecies known to breed in the saltmarshes of the Bay Area. This species can be found in taller vegetation along tidal sloughs, including cordgrass, pickleweed, and marsh gumplant. Although it is occasionally found in bulrushes in brackish marshes, the Alameda song sparrow is a sedentary species and is not known to disperse upstream into brackish or freshwater habitats.

Distribution

The Alameda song sparrow is a permanent resident that is limited to the southern portions of the Bay Area. The other subspecies of song sparrow found in the Bay Area include the Suisun and San Pablo song sparrows, which have restricted ranges in the vicinity of Suisun and San Pablo Bays, respectively. In the LGRP area, another subspecies of the song sparrow (*Melospiza melodia gouldii*) is found in brackish and freshwater marshes and adjacent riparian habitats.

Endangerment

Populations of the Alameda song sparrow have been declining because of loss of habitat resulting from shoreline development and predation by feral animals and native predators.

Occurrence in the Guadalupe River Watershed

The LGRP area may provide marginal nesting habitat for the Alameda song sparrow; however, there is more suitable habitat downstream of the LGRP area. Breeding song sparrows have been observed in the LGRP area; however, because of the difficulty in identifying this subspecies, it is unknown whether the song sparrows represent Alameda song sparrow, the common song sparrow, both races, or intergrades between the two races (Santa Clara Valley Water District 1997c). However, Alviso is cited as a specific location for Alameda song sparrow (Grinnel and Wythe 1927).

Methods and Significance Criteria

This evaluation of impacts on wildlife resources was based on the following sources:

- a species list provided by USFWS in January 2001,
- a CNDDB search performed in January 2001,
- a review of wildlife survey reports performed by the District in 1996 and 1997,
- observations made during site visits in March 2000,
- a review of available data and reports from other surveys performed in the LGRP area, and
- contacts with individuals knowledgeable about wildlife resources in the LGRP area.

Special-status species surveys were performed by the District for clapper rail and red-legged frogs in 1996 and 1997. In 1997, H. T. Harvey & Associates prepared a countywide report on red-legged frog occurrence in Santa Clara County, including the Guadalupe River watershed. No special- status species were observed during the clapper rail or red-legged frog surveys (H. T. Harvey & Associates 1997a).

In addition to special-status species surveys, the District performed breeding-bird surveys in 1996 and 1997 and rodent and bat surveys in 1996 (Santa

Clara Valley Water District 1996c, 1996d). Additional surveys have not been performed specifically for the LGRP area; however, based on a review of the CNDDB search results, the USFWS species list, and other pertinent information, it appears that, although the LGRP area does not provide habitat for any of the state-listed or federally listed species, it may provide suitable habitat for saltmarsh common yellowthroats and Alameda song sparrows. Areas downstream of the Proposed Project provide habitat for special-status species, as noted in the Baylands Mitigation Measure discussion below.

The following criteria were used to evaluate the significance of effects on wildlife. These criteria are based on the State CEQA Guidelines. Construction and operation activities would result in a significant effect on wildlife if they were to result in:

- substantial loss of wildlife habitat, disruption of natural movement corridors for wildlife, or fragmentation or isolation of riparian habitats;
- substantial disturbance or displacement of wildlife from recreational and other human activities;
- direct mortality to, or lowered reproductive success of, federally or state-listed wildlife species or loss of habitat of these species;
- direct mortality to, or lowered reproductive success of, substantial portions of local populations of species that are candidates for federal or state listing or that are California species of special concern, or loss of habitat for these species; or
- long-term or permanent disturbance or displacement from recreational and other human activities of substantial portions of local populations of species that are candidates for federal or state listing or are California species of special concern.

Beneficial effects include changes that would result in net increases in the extent or quality of native riparian, wetland, or upland wildlife habitats. Substantial beneficial effects are identified as significant effects.

The impact analysis below assumes a 17,000 cfs floodflow. Potential impacts associated with the additional 1,350 cfs of interior drainage entering the Guadalupe River are addressed in chapter 4, "Cumulative Impacts."

Alternative 1: No Project

Impact: Potential for Adverse Effects on Common Wildlife Species Associated with Riparian, Wetland, and Upland Habitat Loss

Under the No-Project Alternative, no new structural flood-control features would be constructed and the District's current vegetation management program, as described in chapter 2 under the No-Project Alternative, would continue. The current vegetation management program is resulting in the periodic removal of some riparian, wetland, and upland habitats that are used by common wildlife species in reaches A–G. This vegetation management is altering the normal habitat recruitment processes that would occur in the river corridor if no vegetation management were employed.

Under these current maintenance conditions, existing stands of woody riparian and ruderal vegetation would be retained on the levee banks and in portions of the channel bottom near the low-flow channel; however, natural recruitment beyond the canopies of the existing trees and shrubs would continue to be controlled through vegetation management practices. Such practices would continue to limit the extent of wildlife habitat values to approximately its current level.

Because vegetation management practices under the No-Project Alternative would not substantially reduce existing habitat values or change the current conditions that could affect common wildlife species, this impact is considered less than significant. No mitigation is required.

Alternative 2: Floodwalls/Levee Raise (Proposed Project)

Impact: Potential for Adverse Effects on Common Wildlife Species Associated with Riparian, Wetland, and Upland Habitat Loss

Under the Proposed Project, impacts on approximately 1.67 hectare (4.13 acres) of riparian forest and scrub vegetation, 18.87 hectares (46.62 acres) of nontidal and tidal wetland vegetation and other waters of the United States, 29.85 hectares (73.72 acres) of ruderal vegetation, and 32 meters (104 feet) of SRA overhead cover vegetation from construction and management activities would result in a reduction in habitat values for common wildlife species (table 3-15).

Removal of riparian vegetation would result in the loss of foraging, breeding, and roosting habitat for common wildlife species in the LGRP area. Construction activities under this alternative would result in the loss of approximately 0.87 hectare (2.16 acres) of riparian habitat and would not result in fragmentation of existing riparian habitats because most of the riparian habitat would occur on existing levees and the District would maintain the low-flow channel buffer area. Initial sediment and vegetation management under this alternative would result in the loss of approximately 0.79 hectare (1.97 acres) of riparian habitat; vegetation management at bridge approaches could contribute to slight fragmentation of the riparian corridor. Routine sediment and vegetation maintenance would periodically reduce wildlife habitat within approximately the same management zones throughout the life of the LGRP. Sediment and vegetation maintenance would most likely take place on an irregular basis, depending on the rate of sediment accumulation and vegetation growth (Santa Clara Valley Water District 2001a). Please refer to chapter 6 of the Engineer's Report for a detailed discussion of LGRP maintenance guidelines.

Under the Proposed Project, impacts on approximately 18.77 hectares (46.62 acres) of nontidal and tidal wetland ~~habitat~~ vegetation and other waters of the United States from construction-related activities and sediment and vegetation management would result in a loss of wildlife habitat for common species that are associated with wetland environments (table 3-15). Because most of the construction features for the Proposed Project are located on the tops of levees, the effects of constructing flood-control facilities on wildlife species associated with wetland vegetation would be minimal. Construction-related effects on tidal wetlands and other waters of the United States in the vicinity of SR 237 (for the bridge-raising or bypass option) would have only a temporary effect on wetland wildlife species because the river channel would not be permanently changed in this area. Temporary construction-related disturbance of wildlife species in the construction zone would be expected. There would be permanent impacts on tidal wetlands and other waters of the United States in reach G as a result of construction of new, depressed maintenance roads adjacent to the toe of the levees. Construction and fill in this area would permanently reduce the tidal wetland vegetation that is available to common wildlife species in an approximately 0.98-hectare (2.43-acre) area in this reach on both banks.

Sediment and vegetation management effects on wildlife associated with nontidal and tidal wetlands and waters of the United States would be similar to construction effects, except that habitat would be periodically removed from sediment management areas in reaches B–E and from vegetation management areas in reaches A–G. Wetland habitat loss from these activities would be approximately ~~18.62~~ 16.53 hectares (~~46.0~~ 40.85 acres) and routine maintenance would be required on an irregular basis, depending on the rate of sediment accumulation and vegetation growth, for the life of the LGRP. Annual wildlife effects from loss of habitat in these areas would vary depending on the location and magnitude of the management activity. The potential for fragmentation of wetland habitat for wildlife is expected to be relatively minor because the Proposed Project would maintain a buffer area to the low-flow channel and periodic regrowth of wetland habitat following initial removal would provide habitat value for common wildlife species. Please refer to chapter 6 of the Engineer's Report for a discussion of the maintenance guidelines, methods, and timing of maintenance activities.

The Proposed Project would also result in the loss of up to 29.85 hectares (73.72 acres) of ruderal vegetation from construction and channel maintenance activities (table 3-15). Because this vegetation is the most dominant cover type in the construction areas, impacts on ruderal vegetation would be the greatest of the wildlife habitat impacts discussed. Removal of ruderal vegetation would result in the temporary loss of wildlife foraging, breeding, and roosting habitat in all the project reaches. Such a loss would have a relatively minor effect on wildlife because ruderal vegetation in the lower Guadalupe River is not considered a sensitive natural community and is common cover type in the LGRP area. Most of the impact on ruderal vegetation would be temporary, and the quantity and quality of ruderal vegetation affected, particularly on levee sides, would be replaced during restoration activities that would take place in the LGRP area after construction (please refer to chapter 2 under "Environmental Commitments"). Most restoration of ruderal vegetation would involve only herbaceous species because woody vegetation on levees would be removed in most areas as part of construction of the Proposed Project.

Determination

The effect on wildlife species from loss of riparian and wetland habitat during construction and initial vegetation and sediment management of the Proposed Project is considered a significant impact. These combined activities would result in reducing and fragmenting the amount of sensitive natural communities on which common wildlife species in the lower Guadalupe River depend for forage, breeding, and roosting. Impacts on wildlife species associated with wetlands would be greatest because of the relative impact of periodic sediment management in areas of seasonal and perennial wetlands. Implementation of the mitigation measures listed below would reduce this impact to a less-than-significant level by providing on-site and off-site replacement habitat for wildlife species that inhabit the LGRP area at a quantity and quality that meets current conditions and avoids impacts where possible.

Impacts on wildlife associated with effects on ruderal vegetation from construction and maintenance are less than significant. No mitigation is required.

Mitigation Measure V-1: Replace or Compensate for Loss of Riparian and Wetland Habitat

This mitigation measure is described in detail in the "Vegetation" section of this chapter.

Mitigation Measure W-1: Avoid Nesting Raptors and Birds during Construction and Maintenance

Mitigation Measure W-1 applies to impacts expected to occur during the construction phase of the project. All flood protection maintenance activities will be mitigated under the SMP.

Before construction, the District will fence, or otherwise identify in the field, the boundary of all construction areas to avoid accidental entry into potential nesting areas by construction equipment.

The District will perform preconstruction surveys to determine whether nesting birds, including raptors, special-status bird species, or migratory birds, are present within or immediately adjacent to the project area. ~~If nesting raptors are observed, the nest locations will be fenced until after the young have fledged. Whenever possible, the District will remove potential raptor nest trees before the nesting season, which begins in February. The District will attempt to remove other woody vegetation in fall through early spring to reduce effects on nesting songbirds. The nesting period for most birds is March 1– August 15.~~ If an inactive nest is located in these areas, it will be removed before the start of the breeding season (approximately February 1). If an active raptor nest is found, a buffer zone will be created around the nest tree. The recommended buffer, as identified by DFG, is 76.2 m (250 feet). However, because of the relatively narrow width of the project area and the location and dimensions of the proposed work areas, a 76.2-m (250-foot) buffer may not be feasible in all areas. The District will maximize the buffer width around active nest sites on a site-by-site basis and will consult with DFG on the buffer widths before commencing construction activities. If possible, the District will delay construction around individual raptor nests until after the young have fledged. The District will immediately cease work and contact DFG if a young bird has prematurely fledged the nest as a result of construction-related activities.

Burrowing owls are not expected to occur in the LGRP area and therefore would not be affected by construction-related actions. However, to avoid potential effects on burrowing owls, the District will implement the following measures:

- The District will perform preconstruction surveys, in accordance with the DFG code, to determine whether burrowing owls are present within or adjacent to construction areas. The surveys will be performed by the on-site biologist (see Mitigation Measure W-2) or another qualified biologist. The District will provide the results of the surveys to DFG.
- If burrowing owls are observed during the nonbreeding season (September–January), the District will avoid construction within 48.8 m (160 feet) of the active burrows to avoid disturbing, harming, or killing the owls. Other potential wintering burrows will also be monitored to ensure that no owls are affected during construction. The District may elect to exclude owls from the LGRP during the nonbreeding season by placing 1-way exit doors on all unoccupied potential burrows for 48 hours, then destroying or collapsing unoccupied burrows to prevent their use during the breeding and nonbreeding season. This exclusion method will be implemented throughout the construction period.
- If owls are observed during the breeding season, the District will fence and avoid these areas until after the breeding season.

The LGRP is located in and adjacent to habitat that may support nesting birds protected under the MBTA. Barrier fencing erected as part of the project's vegetation protection measures will also protect nesting vegetation located outside the boundaries of the construction areas. The District will remove all woody vegetation from the construction zones during the nonbreeding season (August 1–February 15) to minimize effects on nesting birds. If construction occurs during the breeding season and all affected vegetation has not been removed, a qualified biologist will survey the construction area for active nests and young migratory birds immediately before construction. If active nests or migratory birds are found within the boundaries of the construction area, the District will develop appropriate measures and will inform DFG of its actions.

Mitigation Measure W-2: Provide an On-Site Biologist during Construction Phase

The District will require on-site biologists to oversee important biological components of the project, including conducting preconstruction surveys, placing exclusion fencing, establishing buffers, clearing vegetation, revegetating, monitoring water quality, and placing diversion structures.

Impact: Temporary Disturbance and Possible Mortality of Common Wildlife Species

The operation of heavy equipment during construction activities could affect wildlife species that are unable to relocate, such as small mammals, amphibians, reptiles, and nesting birds. Construction activities and periodic sediment management activities under the Proposed Project could result in direct mortality to common wildlife species. Construction activities would also temporarily disturb the use of affected or adjacent habitats by wildlife.

Determination

This potential impact of mortality on common wildlife is considered less than significant because

- as described in the "Vegetation" section of this chapter, construction of floodwalls and levees under the Proposed Project would primarily affect ruderal habitats and would have a minimal effect on the channel bottom and associated wetland or riparian habitats;
- initial and routine sediment management activities would take place outside an established low-flow channel buffer area (see appendix G mapping);
- temporary and periodic use of heavy equipment in the LGRP area would not substantially change the amount of disturbance currently occurring in the area;
- vegetation protection measures are incorporated into the LGRP as environmental commitments as indicated in chapter 2, "Proposed Project and Alternatives"; and
- the District would compensate for initial and periodic loss of channel vegetation that supports common wildlife species as part of its SMP as indicated in the "Vegetation" section of this chapter.

No mitigation is required.

Impact: Potential for Loss of Special-Status Species or Potential Habitat for Special-Status Species

Special-status wildlife species that have the potential to occur in the LGRP area were identified from a list provided by USFWS and a CNDDB search. Five listed species have the potential to occur in the LGRP area:

- western snowy plover,
- California clapper rail,
- California least tern,
- salt marsh harvest mouse, and
- California red-legged frog.

None of these species have been observed or are expected to be found in the Proposed Project area because of a lack of suitable optimal habitat; however, marginal habitat for clapper rail is present in reach G and the area between the UPRR bridge and Alviso Marina.

Four species of concern have the potential to occur in the LGRP area:

- saltmarsh common yellowthroat,
- Alameda song sparrow,
- western burrowing owl, and
- southwestern pond turtle.

Common yellowthroats and song sparrows have been observed in the LGRP area. Saltmarsh common yellowthroats breed in emergent vegetation in the general Alviso area (Foster 1977). Any common yellowthroats found breeding in this area would be the salt marsh subspecies. Because of the difficulty in distinguishing the subspecies of song sparrows ~~for each of these species, however,~~ it is not certain whether the Alameda song sparrow ~~these 2 species~~ inhabits the LGRP area, although the Alameda song sparrow is known from the Alviso vicinity as well (Grinnel and Wythe 1927). Although burrowing owls and southwestern pond turtles are found in the vicinity of the LGRP area, the area does not provide optimal habitat for these species; therefore, they are not expected to occur there.

Determination

This potential impact on special-status species or their habitat resulting from the overall construction- and vegetation and sediment management-related activities is considered less than significant because it is not likely to result in the mortality of species listed under the federal or California ESA, species of concern, or candidate species. The District would also require preconstruction surveys to ensure that no special-status wildlife species occur in the construction area (please refer to chapter 2 under "Environmental Commitments"). No mitigation is required.

Impact: Potential for Loss of Wildlife Habitat from Increased Flows in Alviso Slough

The Proposed Project would result in increased flows in Alviso Slough, downstream of the UPRR. The tidal marshes of Alviso and Guadalupe Sloughs are known to support California clapper rails and salt marsh harvest mice, as well as other species. Hydrologic modeling conducted for the Proposed Project indicates that the increase in water surface elevation between the existing conditions during a 396-cms (14,000-cfs) event and the design flow of 481 cms (17,000 cfs) is less than 0.15 m (0.5 foot) between the UPRR bridge and the marina, and that downstream of the marina, there would be no increase in water surface elevation. This relatively minor increase in inundation from the UPRR bridge to the marina is considered biologically insignificant. No significant impacts on special-status wildlife species are expected. No mitigation is required.

Impact: Potential for Loss of Wildlife Habitat from Increased Flooding in New Chicago Marsh

Under existing conditions, New Chicago Marsh would be flooded to a depth of approximately ~~2.2 m (7.2 feet)~~ 1.8 m (6.0 feet) during a 396-cms (14,000-cfs) event. The inundation would last for several weeks. That depth of flooding is sufficient to temporarily reduce the available salt marsh habitat for the salt marsh harvest mouse, Alameda song sparrow and other sensitive species. This impact of flooding occurs under existing conditions. Under the Proposed Project with the Baylands Mitigation Measure in place, the depth of flooding in New Chicago Marsh would be reduced to 0.8 m (2.6 feet) ~~1.3 m (4.3 feet)~~, approximately 1.0 m (3.4 feet) ~~0.9 m (2.9 feet)~~ less than under existing conditions. It would also take less time to empty New Chicago Marsh, assuming past drainage methods and pumping. The decreased depth and duration of flooding under the Proposed Project would improve flooding conditions in the marsh but would not eliminate impacts on salt marsh habitat that would occur under existing conditions. This is considered a beneficial impact. No mitigation is required.

Impact: Potential for Loss of Nesting Habitat for Breeding Birds from Increased Flooding in Ponds A5, A7, and A8W

The Proposed Project would result in increased depth and duration of flooding in several of the salt ponds. Ponds A5 and A7 currently flood to a depth of 1.4 m (4.5 feet) ~~1.8 m (5.8 feet)~~ during a 396-cms (14,000-cfs) event, and Pond A8W floods to a depth of 2.1 m (7.0 feet) ~~2.5 m (8.1 feet)~~. Common shorebirds and terns (no special-status birds are known to nest in these salt ponds) breed on islands and levees within ponds A5, A7, and A8W. There is a possibility that a late-season storm, combined with a slow drawdown, could cause the loss of a breeding season's production on these levees. With the implementation of the Proposed Project and the design event of 481 cms (17,000 cfs), depths in ponds A5 and A7 would increase by an estimated ~~0.4 m (1.2 feet) to 2.0 and 2.1 m (7.0 and 7.1 feet)~~ 0.8 m (2.5 feet) and 2.1 m (7.0 feet), respectively. Pond A8W would flood to a depth of 2.9 m (9.4 feet) under the Proposed Project. ~~There could be pumping as under existing conditions, but it would take longer to empty the increased volume of floodwaters under the Proposed Project than under existing conditions. This~~ The increased depth of flooding would result in an increased duration of flooding, and this could result in loss of a breeding season in these ponds; however, the species that would be affected are expected to be able to find other suitable breeding habitat in the vicinity, and infrequent (under design-flow conditions) loss of a single breeding season is not expected to result in lasting impacts on any of the affected populations. Therefore, the incremental increase in the potential that a breeding season would be lost from flooding under the Proposed Project is considered a less-than-significant impact. No mitigation is required.

Impact: Potential for Impacts on Salt Marsh Harvest Mouse

Under existing conditions, New Chicago Marsh would flood to an approximate depth of ~~2.2 m (7.2 feet)~~ 1.8 m (6.0 feet) during a 396-cms (14,000-cfs) event. The inundation would last for several weeks. That depth of flooding is sufficient to substantially reduce or eliminate the existing population of salt marsh harvest mice within the marsh. This marsh hosts a relatively large population of the species. This impact, which already occurs under existing conditions, is substantial. It may reduce genetic variability within the surviving population and make the survivors less able to withstand future challenges. Such flooding is potentially devastating to the salt marsh harvest mouse population, although it has happened in other flood events (1982, 1983) and the population has rebounded.

Under the Proposed Project with the Baylands Mitigation Measure in place, the depth of flooding in New Chicago Marsh would decrease to approximately 0.8 m (2.6 feet) ~~1.3 m (4.3 feet)~~, approximately 1.0 m (3.4 feet) ~~0.6 m (1.9 feet)~~ less than under existing conditions. The duration of flooding would decrease compared to existing conditions because it would take less time to empty the site by way of drains and pumping. Although depth and duration of inundation would decrease, flooding may still eliminate the existing population of salt marsh harvest mouse, similar to existing conditions. The Proposed Project would also not increase the frequency of flooding in the marsh for the reasons stated above. Therefore, impacts of the Proposed Project are considered less than significant. No mitigation is required.

Impact: Impacts on Snowy Plover as a Result of Increased Flooding in Pond A8D

Pond A8D supports a small but regularly occurring population of breeding snowy plovers. Under existing conditions, about 1.4 m (4.5 feet) ~~1.8 m (5.8 feet)~~ of water would be added to the pond (table 3-4) during a flood event. That water could not evaporate in time for normal breeding to resume without assistance. The Proposed Project would increase the depth of flooding in pond A8D to 2.1 m (7.0 feet), an increase of 0.8 m (2.5 feet) ~~0.3 m (1.2 feet)~~ over existing conditions. This increased depth of flooding would increase the probability that snowy plovers would not be able to use pond A8D to breed. This impact is considered significant because the western snowy plover is federally listed as threatened. To reduce this impact to a less-than- significant level, Mitigation Measure HH-3 would be implemented to ensure that floodwaters in pond A8D are drained before the snowy plover breeding season. Because a previous commitment was made regarding pumping of pond A8D for the Downtown Guadalupe River Flood Protection Project, the District would need to determine which project—the LGRP or the downtown San Jose project—would be required to implement this pumping.

Mitigation Measure HH-3: Pump Cargill Salt Ponds

This mitigation measure is described in detail in the "Hydrologic and Hydraulic Conditions" section of this chapter. It includes pumping of pond A8D to remove floodwaters before the snowy plover breeding season begins.

Alternative 3: Channel Bank Modification

Impact: Potential for Adverse Effects on Common Wildlife Species Associated with Riparian, Wetland, and Upland Habitat Loss

Under the Channel Bank Modification Alternative, impacts on wildlife would be nearly the same as those described for the Proposed Project. Impacts on wildlife species that use ruderal vegetation would be slightly greater than under the Proposed Project because of construction of channel bank modification structures in reaches D–G, but wetland impacts would be slightly less than under the Proposed Project because channel modification structures would be constructed in the levee toe and aprons for MSE walls would be located largely outside wetland areas. This alternative would not require construction of a new SR 237 bridge or bypass option.

Initial and routine sediment and vegetation management effects on wildlife habitat would be the same as those identified for the Proposed Project. Combined construction and management impacts of this alternative would be the loss of approximately 1.4 hectares (3.3 acres) of riparian forest and scrub vegetation, 20.1 hectares (49.6 acres) of wetland vegetation, and 34.7 hectares (85.77 acres) of ruderal vegetation, which would result in a reduction in habitat values for common wildlife species (table 3-16).

Removal of riparian vegetation and wetland and upland habitat would result in the same loss of foraging, breeding, and roosting habitat for common wildlife species in the LGRP area as described for the Proposed Project. Construction activities under this alternative would result in the loss of approximately 0.57 hectare (1.42 acres) of riparian habitat but would not result in the fragmentation of existing riparian habitats because the affected habitats consist primarily of relatively small isolated patches of riparian vegetation, mainly located on levees in the LGRP area. Sediment and vegetation management under this alternative would result in the loss of approximately 0.77 hectare (1.91 acres) of riparian habitat; it would contribute to slight fragmentation of the riparian corridor, mainly at bridge transition areas, because of the need to aggressively manage vegetation in these areas.

Construction impacts would result in the loss of approximately 0.98 hectare (2.41 acres) of wetland habitat, and sediment and vegetation management would result in periodic loss of up to 19.1 hectares (47.2 acres) of wetland habitat (table 3-14). Construction of aprons at the toe of the inboard side of the levee in reaches D–G would result in less impacts on wetlands than under the Proposed Project because use of MSE wall aprons for maintenance roads would largely avoid wetland areas. This alternative would also require construction activities on the outboard side of the levee in reach F. Most of the construction impacts on wetland habitat and other waters of the United States under this alternative would result from construction activities along the drainage ditch located on the west side of the reach F levee. No discharge of dredged or fill material would occur in this area under the Channel Bank Modification Alternative.

Sediment and vegetation management effects on wildlife associated with wetlands and waters of the United States would be the same those described for the Proposed Project. Wetland habitat loss from these activities would be approximately 19.1 hectares (47.2 acres) and would be temporary but recurring, depending on the rate of sediment accumulation and vegetation growth, for the life of the LGRP. Annual effects of routine maintenance on wildlife from loss of habitat in these areas would vary depending on the location and magnitude of the management activity.

The Channel Bank Modification Alternative would also result in the loss of up to 34.7 hectares (85.7 acres) of ruderal habitat that supports common wildlife species during construction (mainly on levees) and channel modification activities (table 3-16).

Determination

The effect on wildlife species from the loss of riparian and wetland habitat during construction and vegetation and sediment management under the Channel Bank Modification Alternative is considered a significant impact. These combined activities would result in some reduction in and fragmentation of the amount of sensitive natural communities on which common wildlife species in the lower Guadalupe River depend for forage, breeding, and roosting. Impacts on wildlife species associated with wetlands would be greatest because of the relative impact of periodic sediment and vegetation management in areas of seasonal and perennial wetlands. Implementation of the following mitigation measures would reduce this impact to a less-than-significant level by providing on-site and off-site replacement habitat at a quantity and quality that meets current conditions and avoids impacts where possible.

Mitigation Measure V-1: Replace or Compensate for Loss of Riparian and Wetland Habitat

This mitigation measure is described in detail in the "Vegetation" section of this chapter.

Mitigation Measure W-1: Avoid Nesting Raptors and Birds during Construction and Maintenance

This mitigation measure is described in detail under the Proposed Project above.

Mitigation Measure W-2: Provide an On-Site Biologist during Construction Phase

This mitigation measure is described in detail under the Proposed Project above.

Impact: Temporary Disturbance and Possible Mortality of Common Wildlife Species

Under the Channel Bank Modification Alternative, disturbance and possible mortality effects on common wildlife species would be similar to those under the Proposed Project, except that construction activities under this alternative would involve more excavation of levees in reaches D–G. Similar to the Proposed Project, the operation of heavy equipment during construction and sediment removal activities could affect wildlife species that are unable to relocate, such as small mammals, amphibians, reptiles, and nesting birds. These activities could result in the direct mortality of common wildlife species.

Determination

This potential impact is considered less than significant because

- construction of this alternative would primarily affect ruderal habitats and would have a minimal effect on the channel bottom and associated wetland habitats or riparian habitats;
- initial and routine sediment management activities would occur outside an established low-flow channel buffer area (see appendix G mapping);

- temporary and periodic use of heavy equipment in the LGRP area would not substantially change the amount of disturbance currently occurring in the area;
- vegetation protection measures are incorporated into the LGRP as environmental commitments as indicated in chapter 2, "Proposed Project and Alternatives"; and
- the District would compensate for initial and periodic loss of channel vegetation that supports common wildlife species as part of its SMP.

No mitigation is required.

Impact: Potential for Loss of Special-Status Species or Potential Habitat for Special-Status Species

Under the Channel Bank Modification Alternative, the potential for effects on special-status wildlife species would be the same as that identified for the Proposed Project because similar amounts of habitat would be affected by both alternatives. Although none of these species have been or are expected to be found in the LGRP area because of a lack of suitable optimal habitat, there is marginal habitat for clapper rail in reach G and the area between the UPRR bridge and Alviso Marina.

Determination

This potential impact on special-status wildlife species or their habitat resulting from overall construction- and vegetation and sediment management–related activities is considered less than significant for the same reasons identified for the Proposed Project. Implementing this alternative is not likely to result in the mortality of species listed under the federal or California ESA, species of concern, or candidate species. As with the Proposed Project, the District would also require preconstruction surveys to ensure that no special-status wildlife species occur in the construction area (please refer to chapter 2 under "Environmental Commitments"). No mitigation is required.

Impact: Downstream Effects on Wildlife from LGRP Floodflows

Under the Channel Bank Modification Alternative, impacts on wildlife habitat in Alviso Slough, New Chicago Marsh, and the Cargill salt ponds would be the same as identified under the Proposed Project because the depth and duration of flooding downstream of the LGRP would be the same for both the Proposed Project and this alternative. Potential impacts on salt marsh harvest mouse would also be the same as described for the Proposed Project. All these impacts are considered less than significant for the same reasons described for the Proposed Project. No mitigation is required.

Impacts on snowy plovers from increased flooding in pond A8D under this alternative are considered significant for the same reasons identified for the Proposed Project; flooding in pond A8D would be increased under this alternative compared to existing conditions. This impact would be reduced to a less-than-significant level by implementing Mitigation Measure HH-4 in a coordinated manner with previous commitments to drain pond A8D.

Mitigation Measure HH-3: Pump Cargill Salt Ponds. This mitigation measure is described in detail in the "Hydrologic and Hydraulic Conditions" section of this chapter.

Alternative 4: Channel Bypass

Under the Channel Bypass Alternative, impacts on common wildlife species that depend on riparian habitat would be slightly greater than under the Proposed Project because a larger construction zone would be required to build box culverts in both the east and west levees than to complete the Proposed Project. Impacts would be particularly severe in reach C, where riparian habitat that supports riparian wildlife species is located on the west bank and levee. Assuming that this alternative could be constructed within approximately 3 m (10 feet) of the levee toes, impacts on SRA cover habitat and the wildlife it supports would be only slightly greater than under the Proposed Project.

Construction impacts of this alternative on wildlife species that depend on wetlands would be slightly greater than under the Proposed Project; culvert construction areas would encroach on wetlands in all reaches, and a level of initial and routine vegetation and sediment management similar to that of the Proposed Project would be needed. Similar to the Proposed Project, these channel modifications would have the greatest impact on wildlife species that depend on nontidal and tidal freshwater habitats. Mitigation similar to that identified for the Proposed Project (Mitigation Measures V-1 and W-1) would be needed to reduce these wildlife impacts to acceptable levels.

Temporary disturbance and mortality of common wildlife species during construction under this alternative would be similar to that of the Proposed

Project, but no additional measures are needed to reduce this impact to acceptable levels. Impacts on special-status wildlife species in the LGRP area under this alternative would not occur for the same reasons identified for the Proposed Project and Channel Bank Modification Alternative; no special-status wildlife species are known to occur in the LGRP area, and the District would conduct preconstruction surveys to ensure that no special-status species would be affected by the project.

Downstream effects on wildlife from LGRP floodflows would also be the same as for the Proposed Project and Channel Bank Modification Alternative; the LGRP design floodflow of 481 cms (17,000 cfs) would be the same for all of the alternatives, and the Channel Bypass Alternative would not change any downstream conditions in Alviso Slough, the Cargill ponds, or New Chicago Marsh.

Baylands Mitigation Measure

The recommended Baylands Mitigation Measure, as identified in the "Hydrologic and Hydraulic Conditions" section of this chapter, would involve construction of an overflow weir and of a levee/floodwall along the perimeter of the town of Alviso, ~~and~~ operation of temporary pumps in ponds A5, A6, A7, A8D, and A8W, vegetation management actions, and placement of armoring on the levee that separates pond A6 from ponds A5/A7. Construction of these facilities could create direct physical impacts on special-status wildlife species. In addition, operation of these flood-control mitigation measures would modify the current flooding pattern in the baylands study area in a manner that could adversely affect special-status wildlife species. The following is a summary of the special-status wildlife species impact analyses ~~prepared by H. T. Harvey and Associates~~ for the recommended mitigation measures. Additional background material ~~The full text of this report~~ is presented in appendix E.

The "Hydrologic and Hydraulic Conditions" section of this chapter describes the existing conditions in the baylands when these are subject to a modeled 396-cms (14,000-cfs) flood event. Under existing conditions, ponds A5, A7, and A8D are subject to flooding up to depths of 1.4 m (4.5 feet) ~~1.8 m (5.8 feet)~~ and pond A8W to 2.1 m (7.0 feet) ~~2.5 m (8.1 feet)~~. Under existing conditions, ponds A13 and A15 are inundated up to 0.5 feet, and pond A17 up to 4.5 feet. All the salt ponds between Alviso and Guadalupe Sloughs would be flooded except pond A6, and New Chicago Marsh is subject to flooding up to approximately 1.8 m (6.0 feet) ~~2.2 m (7.2 feet)~~.

Under existing conditions of a 396-cms (14,000-cfs) storm event, floodwaters have the potential to displace breeding birds for up to 1 season depending on the timing of storm events. Without pumping, water levels in the salt ponds would inundate the flats and levees where various bird species breed. Therefore, excess water is pumped from these salt ponds and from New Chicago Marsh as needed to reduce water levels. In particular, Cargill initiates pumping in ponds A5, A7, and 8W to return water levels to those necessary for salt production. Excess water in New Chicago Marsh is ordinarily evacuated by 2 large drains but, after major storm events, the marsh is pumped for a few weeks until it is nearly dry.

Under the Proposed Project, floodwalls would be incorporated and levees would be raised upstream of Alviso Slough to accommodate floodflows of up to 481 cms (17,000 cfs) downstream of the UPRR bridge. Under project conditions, ~~all the salt ponds described above~~ ponds A5, A6, A7, A8D, and A8W are expected to flood to depths of approximately 2.1 to 2.9 m (7.0 to 9.5 feet) ~~2.1–2.9 m (7–9.4 feet)~~. Flooding in ponds A13, A15, and A17 remains unchanged from existing conditions. New Chicago Marsh flood depths would be reduced by approximately 1.0 m (3.4 feet) ~~1.3 m (4.3 feet)~~.

With implementation of the Baylands Mitigation Measure, construction of the new Alviso weir and associated improvements will deliver flood waters to some of the salt ponds more efficiently and will increase the inundation depths. For a 481 cms (17,000 cfs) storm event, ponds A5, A7, and A8D will be flooded up to 2.4 m (8.0 feet), and pond A8W will be flooded up to 3.2 m (10.5 feet). Therefore, with the Baylands Mitigation Measure, depths in these 3 ponds will be 1.0 foot deeper than without the Baylands Mitigation Measure. With the Baylands Mitigation Measure in place, during a 481 cms (17,000 cfs) storm event, flooding in pond A6 increases from 0 m (0 feet) to 0.6 m (2.0 feet). Flooding in ponds A13, A15, and A17 remains unchanged from existing conditions.

Impact: Potential Effects on Wildlife from Construction of the Alviso Levee

Construction of portions of the proposed Alviso levee improvements, Mitigation Measure HH-1, would take place in an area that has been recently upgraded (1990s). Other areas of the levee would be located in an existing parking lot and along an existing access road. The design and footprint of the levee to protect Alviso could be accomplished without affecting any wetlands, and the levee-raising work would be implemented in the existing top of the levee area.

No known, or suspected, rare or sensitive species are likely to occur within the footprint of the proposed Alviso levee. Construction of the levee is not expected to disturb marsh vegetation, wetlands, habitat for special-status wildlife species, or individuals of special-status species. This impact is considered less than significant. No mitigation is required.

Impact: Potential Impacts on Salt Marsh Harvest Mouse

The installation of the Alviso Slough overflow weir, Mitigation Measure HH-2, in the Cargill levee has an estimated footprint of 1.75 hectare (4.3 acres) ~~0.7 hectare (1.73 acres)~~, based on the 60% plans prepared in March 2002. This footprint includes 0.05 hectare (0.13 acre) ~~121 m^2 (0.03 acre)~~ of narrow patches of salt marsh vegetation and peripheral halophytes located along the interior perimeter of pond A8W and an isolated patch of pickleweed in a low spot on the levee. These areas are too small and isolated to support salt marsh ~~and there is a remote possibility that salt marsh harvest mice could be affected~~. Therefore, this potential impact is less-than-significant and no mitigation is required. ~~This impact is considered significant. Implementation of Mitigation Measure V-2 would reduce this impact to a less-than significant level.~~

Flooding in pond A6 will increase from 0 m (0 feet) to 0.6 m (2.0 feet) with implementation of the Baylands Mitigation Measure. Pond A6 contains a perimeter band of vegetation averaging 30 or more feet wide and may provide habitat for a regular population of salt marsh harvest mice. As described in the Vegetation section of this report, some of the vegetation is on a shelf, grading onto the levee side slopes. Most of the shelf and its associated vegetation, and a portion of the levee side slope, would be inundated. Inundation of this vegetation, albeit a rare event, could cause vegetation die-off and loss of potential habitat for the salt marsh harvest mouse. This loss of habitat would constitute a significant impact. Implementation of Mitigation Measure HH-3 would pump the water out of pond A6 within 24 days of the peak flood event and would reduce this impact to a less-than-significant level.

As part of the Baylands Mitigation Measure, the levee separating pond A6 from ponds A5/A7 will be armored in numerous locations. There is no habitat for the salt marsh harvest mouse on the levee where armoring is proposed.

Mitigation Measure V-2: Additional Replacement or Compensation for Loss of Riparian and Wetland Habitat. This mitigation measure is described in detail in the "Vegetation" section of this chapter.

Impact: Impacts on Snowy Plover as a Result of Flooding in Pond A6

Pond A6 is capable of supporting a small population of western snowy plovers. Under existing conditions, flows in the lower Guadalupe River do not flood pond A6, and much of the interior pan is generally relatively dry. Implementation of the Baylands Mitigation Measure, coupled with the Proposed Project, would flood pond A6 to a depth of 0.6 m (2.0 feet) during a 481 cms (17,000 cfs) storm event. This flooding would prevent snowy plovers from using pond A6 to breed. This impact is considered significant, because the western snowy plover is federally-listed as threatened. To reduce this impact to a less-than-significant level, Mitigation Measure HH-3 would be implemented to ensure that floodwaters in pond A6 are drained before the snowy plover breeding season.

Snowy plovers forage in a variety of mud flat and shoreline habitats, which are abundant even in flood conditions. The flooding of Pond A6 therefore would not be an important loss of foraging habitat. Lack of available breeding habitat is thought to limit the population of snowy plovers in the San Francisco Bay region, therefore protection of known or potential breeding areas is important. Returning Pond A6 to a condition suitable for breeding will prevent the loss of any potential population recruits for the year, thereby reducing a potentially significant impact to a less-than-significant level.

Impact: Impacts on Other Breeding Bird Species

Pond A6 also supports a number of other breeding bird species, including a colony of approximately 20,000 California gulls. Potential loss of breeding for these species, although relatively common, would be a significant impact. Mitigation Measure HH-3 would reduce the impact to a less-than-significant level.

Impact: Potential Wildlife Disturbance from Construction Activities

Construction of the overflow weir, Alviso levee, the maintenance access road near the UPRR bridge, ~~and~~ vegetation management actions near the

UPRR bridge, and armoring of the pond A6 levee could disturb wildlife in nearby areas. Nearby areas include breeding habitat for certain special-status species, which are discussed separately below. Raptors such as northern harriers and white-tailed kite and nesting songbirds may be disturbed by construction of the levee and/or floodwall improvements. This potential impact is considered significant. Implementation of Mitigation Measure W-1 as described for the Proposed Project would reduce this impact to a less-than-significant level by avoiding impacts on nesting birds.

Impact: Loss of Wildlife Habitat from Construction and Implementation of the Baylands Overflow Weir, Armoring of the Pond A6 Levee, and Vegetation Management Actions

Overflow Weir. The installation of the Alviso Slough Overflow Weir in the Cargill levee would have an estimated footprint of 1.75 hectare (4.3 acres), based on the 60% plans prepared in March 2002, and ~~7,020 m^2 (75,535 square feet, or 0.7 hectare [1.73 acres]),~~ not including areas of temporary impact. Construction of the weir is expected to permanently affect tidal marsh habitats along Alviso Slough (primarily brackish marsh), the aquatic habitat of pond A8W and a small amount of diked salt marsh and peripheral halophytes along pond A8W's perimeter, and ruderal habitat on the levees separating the two.

The temporary disturbance of open-water habitat in pond A8W is considered less than significant because the open-water habitat would not be permanently lost and is locally abundant. The loss of upland habitat is considered less than significant despite the presence of loggerhead shrikes that breed adjacent to the weir site because of the high proportion of nonnative species contributing to its relatively low habitat value at the proposed weir location. The loss of tidal marsh habitat associated with construction of the weir is considered significant. Construction of the weir is expected to result in permanent loss of ~~120 m^2 (0.03 acre)~~ 0.05 hectare (0.13 acre) of diked saltmarsh and ~~400 m^2 (0.1 acre) of~~ brackish marsh. Alameda song sparrows nest in brackish and saltmarsh habitats, and saltmarsh common yellowthroat nest in freshwater, brackish and saltmarsh habitats. These species, and others with similar requirements, would most likely be affected by the loss of habitat. The impact of constructing the weir is therefore considered significant because of the resulting loss of tidal marsh habitat. Implementation of Mitigation Measure V-2 would reduce this impact to a less-than-significant level.

Mitigation Measure V-2: Additional Replacement or Compensation for Loss of Riparian and Wetland Habitat. This mitigation measure is described in detail in the "Vegetation" section of this chapter.

Vegetation Management Actions. Vegetation management activities and the construction of a maintenance access road proposed immediately downstream of the UPRR bridge would permanently affect an area of 15,985 m^2 (3.95 acres). The combined actions are expected to affect tidal freshwater and brackish marsh habitat and ruderal habitat resulting from the removal of vegetation, herbicide application, and construction of maintenance roads. Impacts on approximately 15,662 m^2 (3.87 acres) of marsh vegetation and 324 m^2 (0.08 acre) of ruderal vegetation would be expected. These actions would permanently remove vegetation that provides nesting habitat for resident saltmarsh common yellowthroat and Alameda song sparrow. These species and others with similar requirements would most likely be affected by loss of habitat up to 1.6 hectares (3.95 acres), primarily of marsh habitat. The impact of implementing these actions is considered significant because of the resulting loss of wildlife habitat. This impact would be reduced to a less-than-significant level by replacing marsh habitat for wildlife species in the District's pond A4. Mitigation Measure V-2 will include replacing this marsh habitat.

Mitigation Measure V-2: Additional Replacement or Compensation for Loss of Riparian and Wetland Habitat. This mitigation measure is described in detail in the "Vegetation" section of this chapter.

Impact: Impacts on Western Burrowing Owl

No burrowing owl habitat is expected to be affected by the Alviso levee/floodwall because construction would take place only on the levee tops. There are areas very near the proposed levee that have supported burrowing owl. If burrowing owls occur in the immediate vicinity of construction activities, nesting burrowing owls could be disturbed. That disturbance would constitute a significant impact.

The installation of the Alviso Slough overflow weir in the Cargill levee has an estimated footprint of 1.75 hectare (4.3 acres) ~~0.7 hectare (1.73 acres)~~. Areas adjacent to the project site are potential nesting habitat for burrowing owl. If burrowing owls occur in the immediate vicinity of construction activities, nesting burrowing owls could be disturbed. That disturbance would constitute a significant impact.

As described previously, the Baylands Mitigation Measure includes construction of a new maintenance access road on the east bank of the river, immediately downstream of the UPRR bridge. Burrowing owls are known to nest in the outer portion of the levee where this activity will occur. Additionally, areas adjacent to the project site are potential burrowing owl nesting habitat. If burrowing owls occur in the immediate vicinity of the construction activity, nesting burrowing owls could be disturbed. That disturbance would constitute a significant impact. Implementation of Mitigation Measure W-1 as described for the Proposed Project would reduce impacts on burrowing owls to a less than significant level by avoiding impacts on nesting birds.

Fisheries

Existing Conditions

Fish Known to Live in the Guadalupe River

The study area for the evaluation of fisheries focuses on the LGRP area and encompasses the Guadalupe River watershed, providing information about the factors that may affect the abundance and distribution of fish species in the river. Information on lower Guadalupe River fisheries is based on fish and habitat surveys conducted by Jones & Stokes in 1997 (Jones & Stokes 1997). The Guadalupe River supports anadromous and resident fish species typical of coastal and Bay Area rivers and streams. Anadromous species are fish that mature in the ocean and migrate to freshwater to spawn; the juveniles spend variable periods of time in freshwater before migrating to the ocean. Anadromous species found in the Guadalupe River include chinook salmon (*Oncorhynchus tschawytschya*), steelhead/rainbow trout (*O. mykiss*), and Pacific lamprey (*Lampetra tridentata*). Anadromous fish are found primarily in the mainstem of the river because dams and other channel structures block or impede their access to tributary streams; however, fish ladders at the Alamitos drop structure and Masson Dam provide access for fish to Guadalupe Creek, Alamitos Creek, and Arroyo Cabero.

The term *resident species* refers to fish that spend their entire lives in fresh water. The Guadalupe River supports both native and introduced resident species. Native resident species include Sacramento sucker (*Catostomus occidentalis*), California roach (*Hesperoleucus symmetricus*), hitch (*Lavinia exilicauda*), prickly sculpin (*Cottus asper*), and riffle sculpin (*Cottus gulosus*). Introduced resident species include largemouth bass (*Micropterus salmoides*), green sunfish (*Lepomis cyanellus*), goldfish (*Carassius auratus*), carp (*Cyprinus carpio*), mosquitofish (*Gambusia affinis*), brown bullhead (*Ictalurus nebulosus*), and pumpkinseed (*Lepomis gibbosus*) (U.S. Army Corps of Engineers 2000). Tributaries in the upper reaches of the river basin primarily support native species, such as rainbow trout, California roach, Sacramento sucker, and sculpin.

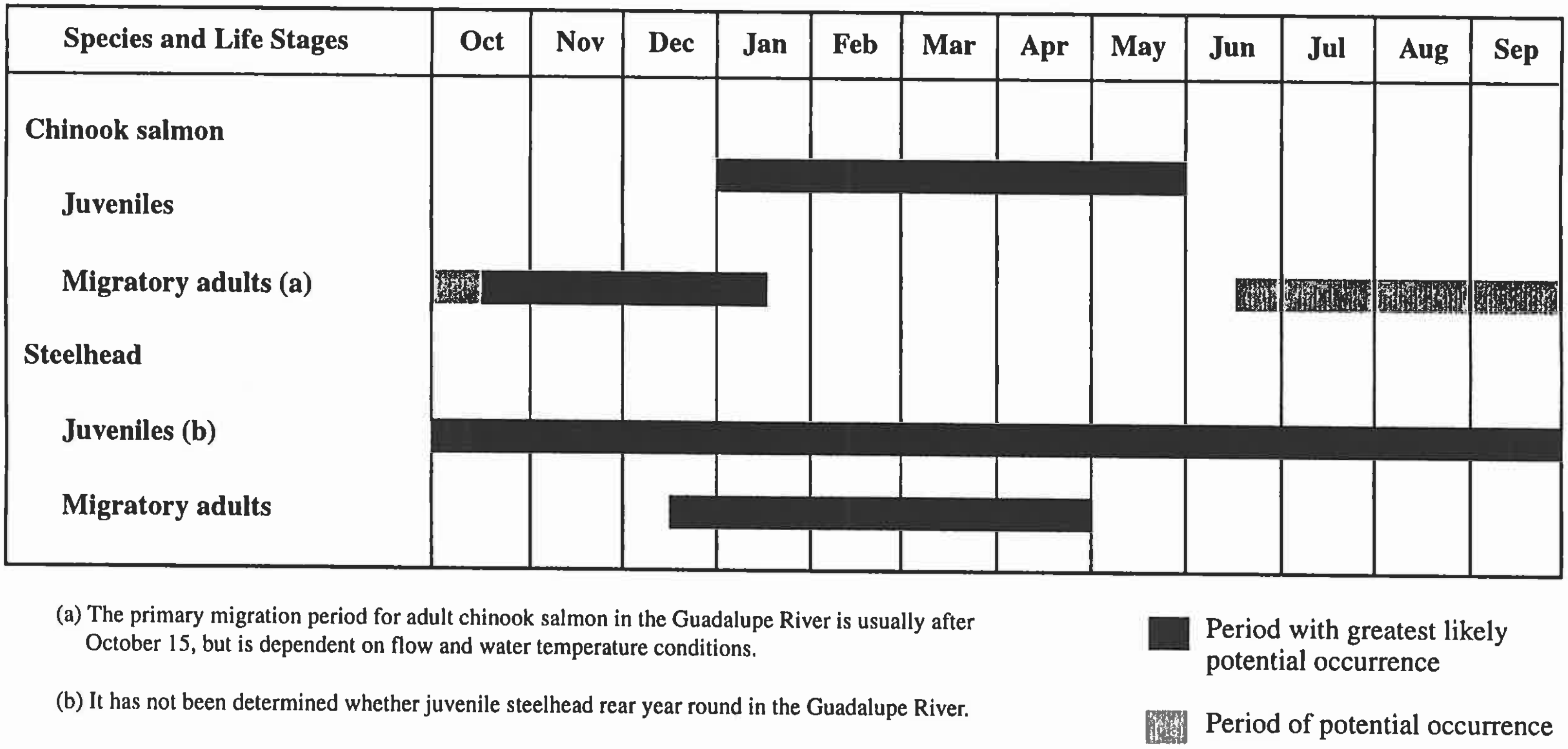
Special-Status Fish Species

Steelhead and chinook salmon are special-status fish species that live in the LGRP area. The Central California Coast steelhead evolutionarily significant unit (ESU) has been listed as threatened under the ESA (62 FR 159), and the Guadalupe River is designated critical habitat for this species (65 FR 7764). NMFS considers the chinook salmon in the Guadalupe River to be part of the Central Valley fall-run and late-fall-run chinook salmon ESUs. NMFS has determined that the Central Valley fall and late-fall-run chinook salmon ESU does not warrant listing, but the species is considered a candidate species (64 FR 50394). In addition, the Guadalupe River is considered EFH for chinook salmon. The Magnuson-Stevens Act, as amended by the Sustainable Fisheries Act of 1996 (PL 104-267), defines EFH as the waters and substrate necessary for fish to spawn, breed, feed, and grow to maturity.

Historically, steelhead may have existed in the Guadalupe River system (Skinner 1962), but no available data provide a historical or present-day estimate of the population of adults returning to the river during annual migration. After the completion of Almaden and Guadalupe Reservoirs in the mid-1930s and Lexington Reservoir in 1952, steelhead were restricted to tributary streams downstream of the dams. These reservoirs forced the steelhead entering the Guadalupe River system to spawn primarily in the lower reaches of the river and in Los Gatos and Ross Creeks. In February 1994, adult steelhead were observed below the Alamitos drop structure, downstream of Almaden Reservoir (U.S. Army Corps of Engineers 2000); they have been observed as recently as February 1999. Fish ladders at the Alamitos drop structure and Masson Dam currently provide upstream fish access.

According to Shapovalov and Taft (1954), steelhead migrate up the Guadalupe River from November through April and spawn from January through May. Spawning is most likely to occur before April in much of the Guadalupe River system because of water temperature constraints. Eggs hatch from March through early June. Juveniles remain in fresh water for a minimum of 1 year and begin to migrate to the ocean as smolts from November through June. (Smolts are juvenile fish that migrate downstream and undergo the physiological changes that enable them to survive in saltwater.) Figure 3-20 provides the approximate timing of the presence of the life stages of steelhead in the Guadalupe River.

Although there is no historical account of chinook salmon migrating and spawning in the Guadalupe River, fall-run chinook salmon have lived in the river during at least the last decade. There is also no historical information available on the number of adults returning during their annual migration. Although genetic analysis of these chinook salmon to determine their origin



(a) The primary migration period for adult chinook salmon in the Guadalupe River is usually after October 15, but is dependent on flow and water temperature conditions.

(b) It has not been determined whether juvenile steelhead rear year round in the Guadalupe River.

Source: Shapovalov and Taft 1954, Moyle 1976.

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Figure 3-20. Approximate Temporal Occurrence of Chinook Salmon and Steelhead Trout in the Guadalupe River

has been inconclusive, some of their genetic material has been consistent with populations from the Sacramento-San Joaquin River system (Nielson 1995).

Chinook salmon currently migrate up the Guadalupe River and, to a lesser extent, Los Gatos Creek to spawn. Adult chinook salmon may enter the river from August through December, but most adults arrive from September through November. From October through December, the chinook salmon spawn in the river reaches above the influence of tidewater to downstream of the Alamitos drop structure; a new fish ladder completed in 1999 provides them with access to the stream reaches above Almaden Lake. The majority of chinook salmon spawn in and around the downtown San Jose area. Their eggs hatch after about 2 months, and the young remain in the gravel for several weeks before emerging as fry (Raleigh et al. 1984). Juveniles may be present in the river from January through June, but most migrate 1 or 2 months after emergence. Figure 3-20 provides the approximate timing of the presence of the life stages of chinook salmon in the Guadalupe River.

Key Factors Affecting Fish and Fish Habitat

Key factors that affect fish and fish habitat in the Guadalupe River hydrologic and hydraulic conditions, channel erosion and deposition, river geomorphology, water temperature, SRA cover vegetation, suspended solids and toxic constituents, and species interaction.

Hydrologic and Hydraulic Conditions

Hydrologic and hydraulic conditions, or flow, directly determine the area and volume of physical habitat for fish (Orth 1987, Bain et al. 1988). Habitat components affected by hydrologic and hydraulic conditions include water temperature, water depth and velocity, substrate, and SRA cover vegetation, as discussed below.

The Guadalupe River is a "flashy" system, which means that flow increases dramatically in response to rain. Typically, flows peak in winter or early spring in response to peak watershed runoff. Flows are low during late summer and early fall, before the onset of seasonal rains. Flows during winter and early spring are usually less than 2.83 cms (100 cfs). Flows from May through October are usually less than 0.14 cms (5 cfs). During the dry summer and fall months, low flows can restrict fish to pools and other areas of the river where sufficient surface water remains. Flows less than 0.11–0.42 cms (4–15 cfs) result in riffle depths less than 0.18–0.24 m (0.6–0.8 foot) at some locations downstream and within the LGRP area, potentially impeding passage of steelhead and chinook salmon (Thompson 1972). Prolonged periods of low surface flow in the river reduce fish survival, growth, and spawning success because of increased competition for living space and food, elevated water temperatures, low levels of dissolved oxygen, and impaired passage.

Since the 1930s, reservoir construction and operation have increased summer flows in some of the stream reaches downstream of the dams compared with flows before 1930 (Santa Clara Valley Water District, unpublished data). The increased flow in these reaches provides additional fish habitat during summer. Water diverted from the Delta has periodically been discharged into the river at several locations, including Guadalupe Creek near Masson Dam. This increased flow may provide additional fish habitat.

When steelhead and other anadromous fish encounter multiple channels containing flow, they may be attracted to the channel that has higher flow velocity (Powers and Orsbon 1985, Bell 1991); however, anadromous fish may also be adversely affected if the velocity impairs their ability to navigate the channel. Steelhead can swim at a sustained velocity of 1.4 m per second (mps) (4.6 feet per second [fps]) for extended periods, although the optimum migration velocity is less (Thompson 1972). Average flow velocities in the lower Guadalupe River channel exceed 1.4 mps (4.6 fps) during floodflows. Although high average velocity may indicate potential passage impediments, the velocities across the channel may include those that allow passage because flows are not uniform. In addition, floodflows are of short duration and would have minimal effect on adult fish passage. Steelhead can swim at a sustained velocity as great as 4.17 mps (13.7 fps) for short periods of time and can maintain a maximum speed of 8.08 mps (26.5 fps) for short distances. Although steelhead can navigate in high-velocity conditions to facilitate jumping obstacles, it is likely they would avoid areas where velocity exceeds 4.17 mps (13.7 fps). The availability and location of suitable resting areas also affect their ability to successfully navigate high-velocity conditions.

Channel Erosion and Deposition

Erosion and deposition of channel-bed soil can alter fish habitat conditions that are critical to migration, spawning, feeding, resting, and refuge from predators. Habitat conditions affected by erosion and deposition include the depth of riffles and pools and the presence and quality of cover and spawning gravel. The movement of sediments maintains habitat conditions by flushing sand and silt from spawning gravel. The sediment input in the lower Guadalupe River has been reduced since the 1930s, and the river channel appears to be eroding in reaches A and B; however, the presence of coarse-grained material and resistant clay and silt deposits suggests that erosion is limited to local sites or is arrested. Reduced erosion and deposition processes have most likely reduced fish habitat diversity, which, in turn, alters native fish species and, ultimately, the abundance and community composition of native fish species in the river (Meyer et al. 1999).

River Morphology

Channel form includes barriers that potentially block the upstream migration of anadromous fish. Flows greater than 0.11–0.42 cms (4–15 cfs) provide depths over riffles greater than 0.18–0.24 m (0.6–0.8 foot), allowing passage of steelhead and chinook salmon (Thompson 1972). Fish movement in the Guadalupe River has been limited by dams, weirs, stream crossings, pipelines, and other physical features. In the LGRP area, exposed gas and sewer lines north of the Old Julian Street Bridge create potential barriers to the migration of steelhead and chinook salmon. Between the downtown San Jose area and the Alamitos drop structure, weirs and stream crossings could affect salmonid migration. Some of the weirs and stream crossings in the river watershed have recently been modified to promote fish passage, and subsequent, successful passage of steelhead and chinook salmon has been documented (Gilroy pers. comm.). Historically, the Alamitos drop structure downstream of Almaden Lake blocked the passage of anadromous fish; however, steelhead and chinook salmon now have passage over a fish ladder added in November 1999. This ladder enables anadromous fish to access several miles of habitat in Guadalupe and Alamitos Creeks. Barriers to fish passage, including dams, weirs, culverts, and gabions installed in the stream channel, also exist upstream of Almaden Lake in Alamitos Creek. Masson Dam blocked upstream passage to Guadalupe Creek in the past, but it is now laddered.

River geomorphology includes substrate and channel form. *Substrate* refers to the composition of the channel bed, including clay, silt, organic detritus, sand, gravel, cobble, and rock. Substrate is an important component of fish spawning and rearing habitat. In general, streams with gravel-cobble substrates support greater diversity and abundance of invertebrates (Waters 1995). In areas where sediments have accumulated, substrate scouring action increases the diversity of aquatic macroinvertebrate species by increasing their available habitat (Allen and Hassler 1986, McEwan and Jackson 1996). The invertebrates are an important source of food for fish, including chinook salmon and steelhead (Waters 1995). In addition, gravel substrates are needed to support the spawning of chinook salmon, steelhead, Pacific lamprey, and other species. Adult steelhead and chinook salmon require relatively clean gravel in which to lay their eggs. When the small spaces between gravel particles are filled with silt and sand, the flow of water and amount of oxygen available to the eggs and larvae in the gravel are reduced. Fine sediments can also reduce or prevent young fish from emerging after they have hatched. A key factor in keeping gravels free of fine sediments is adequate flow—usually a flow that just fills a natural channel to flood state (Rosgen et al.1986).

Surveys in 1992–1993 determined that gravel substrates in the Guadalupe River are relatively shallow and contain a high percentage of sand- and silt-size particles (The Habitat Restoration Group 1994). A high proportion of sand and silt in gravel substrates most likely limits the production and diversity of invertebrates and may also limit spawning success for steelhead, chinook salmon, and other fish species. Riffles provide important fish-spawning habitat and food-producing areas primarily because flow velocity in riffles maintains gravel substrates. The habitat value of runs generally varies with the pools and riffles, depending on depth, flow velocity, and the resulting substrate conditions. Because of their depth, pools provide cover and moderate daily variability in water temperature. Pools are, potentially, an important refuge for coolwater species, such as steelhead and chinook salmon, especially during warm months and during upstream migration. Stream reaches with a 50:50 ratio of pools to riffles are generally thought to provide optimum rearing conditions for juvenile chinook salmon and steelhead (Raleigh et al. 1984, 1986).

Stream surveys conducted in 1986 and 1987 indicate that channel form in the mainstem of the Guadalupe River consists primarily of pools and runs, with riffles constituting less than 10% of the stream length (The Habitat Restoration Group 1991, 1994, 1995). These conditions were created largely by straightening and confining the natural river channel when the Guadalupe River was converted to a managed floodway.

Habitat for steelhead and chinook salmon upstream of Almaden Lake on Alamitos Creek, Arroyo Calero, and Guadalupe Creek is considered to be of relatively good quality, on the basis of surveys conducted by USFWS (White pers. comm.). Pool and riffle habitats are present in proportions that benefit steelhead and chinook salmon juveniles in each creek. The high degree of stream shading, combined with flow releases from the upstream reservoirs in summer, maintains summer water temperatures below 70°F in most tributary reaches. USFWS has indicated that tributary streams could support a fair-to-moderate anadromous fish population.

Suspended Solids and Toxic Constituents

In general, the growth and survival of fish and other aquatic organisms may be reduced by the toxic effects of insecticides, metals, nutrients, herbicides, and suspended solids. Toxic materials enter the Guadalupe River from various sources, including mines, agricultural runoff, and drainage discharge. The lower Guadalupe River has numerous stormwater drainage discharges downstream of reach B. Toxic materials can cause fish to die within a few days or adversely affect their growth and development, thereby limiting chances for survival. Toxic materials can affect all life stages of fish and foodweb organisms.

Urban runoff is the primary factor affecting the level of suspended solids and toxic constituents in the river. The SFBRWQCB and EPA have listed the Guadalupe River, Alamitos Creek, and Guadalupe Creek as impaired by mercury contamination caused by gold rush–era mining activities for cinnabar deposits. Although adverse effects of urban runoff on fish and aquatic organisms are not evident in the Guadalupe River, toxic constituents have been identified. The City posts signs along the river to warn residents about eating fish caught from the river, and the District and the SFBRWQCB are implementing programs to address the matter of pollution and to protect the biological resources of the Guadalupe River.

Water Temperature

Water temperature has an important effect on fish growth, reproduction, survival, and migration. This is especially true for steelhead and chinook salmon, which have relatively narrow temperature tolerances for each stage in their development (table 3-17). The baseline water temperature conditions are presented in the "Water Quality" section of this chapter and in appendix C.

On the basis of the limited measured water temperature data available for the river basin for 1996, 1997, and 1998, water temperature conditions are generally inhospitable to steelhead and chinook salmon. The recent improvements in fish passage, discussed above under "River Morphology," have increased the amount of suitable habitat available to these fish. Most area streams are now accessible to adult steelhead and chinook salmon, including reaches with relatively high frequencies of optimal water temperature conditions, as measured by the District from September 1995

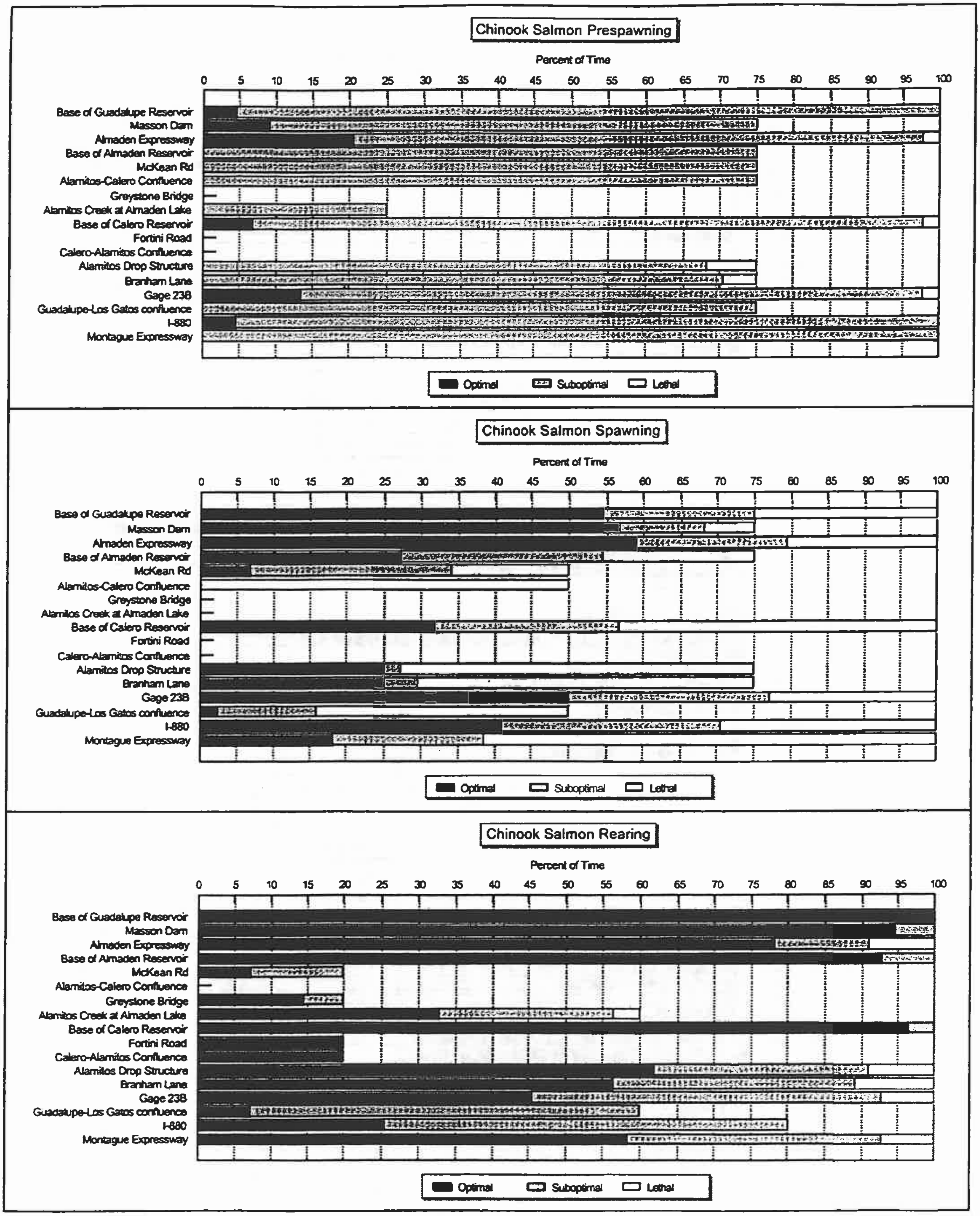
Table 3-17. Optimal, Suboptimal, Unacceptable, and Lethal Temperature Ranges (°F) for Various Life Stages of Chinook Salmon and Steelhead

Life Stage	Chinook Salmon	Steelhead
Prespawning Adults	August–December	November–April
Optimal	46.4–53.6	44.0–57.0
Suboptimal	53.6–75.2	57.0–65.0
Unacceptable	>75.2	>65.0
Egg Incubation	October–March	January–May
Optimal	41.0–57.2	44.6–53.6
Suboptimal	57.2–60.8	53.6–60.8
Lethal	>60.8	>60.8
Juvenile Rearing	January–June	All Months
Optimal	53.6–64.4	53.6–64.4
Suboptimal	64.4–75.2	64.4–77.0
Lethal	>75.2	>77.0
Juvenile Emigration	February–June	January–July
Optimal	53.6–64.4	44.6–59.9
Suboptimal	64.4–75.2	59.9–66.2
Unacceptable	>75.2	>66.2

Sources: Raleigh et al. 1984, 1986; Rich 1987; Shapovalov and Taft 1954; Moyle 1976.

through November 1997. Figures 3-21 and 3-22 provide a summary of Guadalupe River water temperature conditions and the relationship of these conditions to the needs of chinook salmon and steelhead at various life stages.

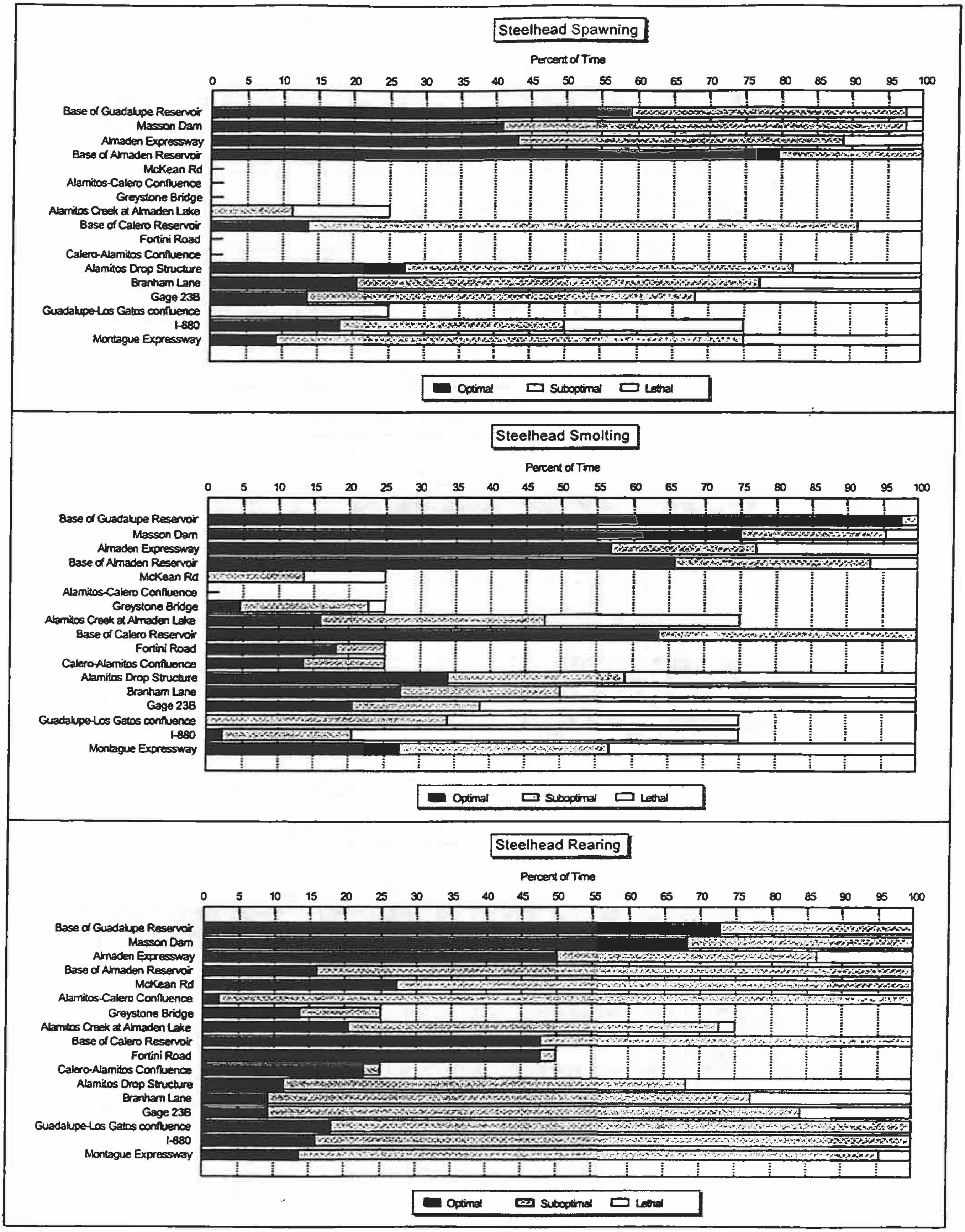
In the Guadalupe River, between the Guadalupe River-Los Gatos Creek confluence and at I-880, the water temperatures are frequently not conducive to the various life stages of chinook salmon and steelhead, sometimes to the point of being lethal. Water temperatures limit the successful spawning of steelhead to January and February. By April, water temperatures have reached the range at which they are lethal to the incubating steelhead eggs; therefore, for spawning and incubation to be successful, the fish may restrict their reproductive activities to tributary streams. From December through March, water temperatures are usually conducive to steelhead smoltification (the adaptation that juvenile anadromous fish require to facilitate their survival in saltwater). Water temperatures increase and become progressively detrimental for smoltification from April through June. Water temperatures are highest and most restrictive to juvenile steelhead rearing in July and August. Water temperatures exceeding 77°F, considered lethal to the rearing of steelhead, occur more than 40% of the time in measured data recorded between Almaden Lake and downtown San Jose, upstream of Los Gatos Creek. Temperatures are lower downstream of the



Notes: Values represent percentage of temperature measurements at a given station that fall within the threshold temperatures for each suitability category. Data collected in 1996-97. Incomplete bars represent missing data.

09230.99 540 (7/01)

Figure 3-21. Existing Water Temperature Suitability for Steelhead Life Stages at 17 Locations in the Guadalupe River System



Notes: Values represent percentage of temperature measurements at a given station that fall within the threshold temperatures for each suitability category. Data collected in 1996-97. Incomplete bars represent missing data.

09230.99 540 (7/01)

Figure 3-22. Existing Water Temperature Suitability for Chinook Life Stages at 17 Locations in the Guadalupe River System

Guadalupe River–Los Gatos Creek confluence and rarely exceed the lethal threshold.

In September and October, water temperatures in the Guadalupe River are high and usually lethal to incubating chinook salmon eggs. Lethal temperatures remain through the early stages of migration and extend through October or November. From December through February, water temperatures decrease and support the survival and development of the incubating eggs. Water temperature conditions are generally adequate for rearing from February through May or June. Juvenile salmon usually outmigrate by the end of June, before temperatures increase and become lethal.

Water temperature conditions in the lower Guadalupe River, discussed in the "Water Quality" section of this chapter, are similar to those in other reaches of the Guadalupe River, with lethal temperatures for anadromous fish from June through October or November and adequate temperatures for survival from December through May.

Shaded Riverine Aquatic Cover

SRA cover is composed of overhead riparian vegetation and instream cover, including tree roots, boulders, woody material, and undercut banks. The SRA cover provides fish with shade and protection from predators, increases streambank stability and habitat complexity, and provides habitat for food organisms. Shaded stream surface is an indication of the amount of overhead cover. Most of the SRA cover in the lower Guadalupe River is located in reach C. There are approximately 3,409 linear meters (11,184 feet) of SRA cover in the LGRP area. Please refer also to the "Vegetation" section of this chapter for a discussion of SRA cover habitat.

Species Interactions

Several nonnative fish species, including largemouth bass and sunfish (*Lepomis* ssp.), were introduced into California streams before 1900. Several of these species live in the Guadalupe Rive and compete with native species for food and cover, possibly preying on eggs, larvae, and juveniles. The upstream reservoirs provide habitat that supports populations of introduced species. It is likely that the loss of stream habitat combined with increased populations of nonnative species has been detrimental to native species populations. When migratory species, such as steelhead and chinook salmon juveniles, enter a system with human-made structures, they can become disoriented and stressed by flow and water-temperature conditions associated with dams, weirs, and impoundments. When stressed, they are more vulnerable to predation by the nonnative fish. Actions such as vegetation removal or streamflow reductions that result in increased stream water temperatures can benefit nonnative, warmwater species such as largemouth bass at the expense of coolwater species such as steelhead and chinook salmon.

Methods and Significance Criteria

This impact assessment addresses the effects of the No-Project Alternative and 2 LGRP action alternatives on fishery resources, including adult and juvenile anadromous fish migration, anadromous fish spawning and incubation, and resident and anadromous fish rearing. This impact analysis provides an evaluation of the following key factors that might affect fish in the lower Guadalupe River:

- hydrologic and hydraulic effects,
- channel erosion and deposition,
- river morphology,
- suspended solids and toxic constituent effects,
- water temperature effects, and
- SRA cover effects.

The following criteria, based on State CEQA Guidelines, were used to evaluate the significance of effects on the fish of the lower Guadalupe River and their habitat. A significant effect on fish and fish habitat would occur if an alternative would

- substantially reduce fish habitat;
- cause fish populations to drop below self-sustaining levels;
- threaten to eliminate a fish community; or
- reduce the numbers of a rare, threatened, or endangered fish species.

The significance criteria used in this analysis are based on mandatory findings, as required under CEQA. Specific determination of fish populations and the response of the fish community in the lower Guadalupe River are not possible with the information available; therefore, this impact assessment assumes that substantial reduction in fish habitat could directly reduce the abundance of fish and alter the fish communities in the lower Guadalupe River.

The impact analysis below assumes a 17,000 cfs floodflow. Potential impacts associated with the additional 1,350 cfs of interior drainage entering the Guadalupe River are addressed in chapter 4, "Cumulative Impacts."

Alternative 1: No Project

Impact: Potential for Minor Fish Habitat Changes

Under the No-Project Alternative, impacts on fisheries resources in the LGRP area would include periodic disturbance, the removal of vegetation in areas adjacent to the low-flow channel, and possibly the temporary disturbance of sediment in limited areas, such as bridge approaches, where minor amounts of sediment are excavated in reaches B–E. Vegetation management would involve current vegetation removal in limited areas within the lower Guadalupe River. Limited vegetation management would take place in reaches F and G, and only minor vegetation management would take place in reach A until mitigation plantings are established. Existing vegetation management operations do not affect the stream channel or fish habitat because no vegetation is removed from the low-flow channel or riparian buffer area. Please refer to chapter 2, "Proposed Project and Alternatives." Current vegetation management activities do not affect SRA cover within the project reaches. Vegetation management would not affect existing SRA cover because mature trees are not currently removed for routine maintenance. Under the No-Project Alternative, surface-water temperature conditions are not expected to change as a result of vegetation management activities.

Under the No-Project Alternative, channel morphology would be unaltered and the existing riverflow conditions would remain unchanged. In limited areas throughout reaches B–E, minor sediment removal would not create changes to the channel that could affect fish habitat because sediment removal would occur only when the riverflow is contained in the low-flow channel and it typically occurs in dewatered portions of the channel. If sedimentation of the LGRP reaches continued, it could eventually create changes in riffle depth and flow in the low-flow channel. These conditions have the potential to inhibit upstream migration of anadromous species and to become low-flow fish barriers for upstream-migrating fish. Anadromous fish need approximately 0.24 m (0.8 foot) of water to navigate short, shallow riffles; therefore, some sediment removal would be desirable if barriers to fish passage were created by continued aggradation of the channel. Under the No-Project Alternative, the amount of suspended solids or toxic materials in the LGRP area would not increase. The No-Project Alternative would have a less-than-significant impact on the fisheries resources in the LGRP area because streamflows would remain unchanged by the current management activities and flow velocities and depths would be similar to that of existing conditions. Only minor sediment removal would occur in areas outside the low-flow channel, no SRA cover would be removed under the current sediment and vegetation management practices, and stream temperatures would not be changed.

Alternative 2: Floodwalls/Levee Raise (Proposed Project)

Impact: Potential for Changes in Fish Habitat from the Construction of Floodwalls, Levees, and Other Structures

Under the Proposed Project, the construction of flood-control facilities could result in changes to fish habitat in a number of locations throughout reaches A–G. Impacts associated with bank contouring and vortex rock weirs in reach A and the construction of floodwalls or levees in reaches A–G could result in temporary sediment erosion effects or toxic spills at the construction sites.

In reach A, banks would be contoured just downstream of I-880 within approximately 30 m (98.4 feet) of the bridge in areas outside the low-flow channel where fish habitat is located. Reach A banks would be stabilized to ensure that they would not erode or otherwise fail during flood events. Construction activities could temporarily increase the input of fine sediment in the stream, but standard construction measures to control the sediment, as identified in chapter 2 under "Environmental Commitments," would minimize this potential impact.

The construction of as many as 4 vortex rock weirs in reach A could result in minor release of fine sediments into the low-flow channel that could affect fish habitat. Vortex rock weirs would stabilize the channel bottom and create plunge pools at several locations in an area immediately downstream of I-880 in reach A. These structures are expected to improve fish habitat by enhancing the pool/riffle sequence in this area of the channel. Constructing these structures in the low-flow channel would result in minor impacts because

- low-flow channel disturbance would be in a small localized area and would be temporary;

- the design would include consideration of the need to allow for anadromous fish passage (please refer to chapter 2, "Proposed Project and Alternatives"); and
- the direct effect of the weirs on streamside and low-flow channel fish habitat would be extremely small.

Vortex rock weirs would not affect SRA cover because mature trees would not be removed for these structures; therefore, these weirs would not create a change in stream water temperatures that could adversely affect fish.

Under the Proposed Project, the construction of floodwalls and levees in reaches A–G would have no effect on fisheries resources because these structures would not require construction in or near the low-flow channel. Minor sedimentation impacts in the overbank areas could result from construction, but standard sediment control measures, as identified in chapter 2 under "Environmental Commitments," would minimize this potential impact. Existing water velocity, stream depth, or channel morphology would not be affected by these structures. These potential impacts are considered less than significant. No mitigation is required.

Impact: Potential for Changes in Fish Habitat from Construction of a New SR 237 Bridge

Under the Proposed Project, demolition of the eastbound SR 237 bridge and reconstruction of a new bridge to match the westbound bridge profile could create temporary construction-related impacts in the vicinity of the reach F low-flow channel. If construction activities are required in the low-flow channel, the District would implement measures to reduce the impacts on fish passage and fish habitat, as indicated in chapter 2 under "Environmental Commitments." The potential for construction-related impacts on fisheries resources during bridge replacement is considered less than significant because

- construction activities would be temporary,
- SRA cover would not be affected,
- permanent barriers to fish passage in the low-flow channel would not be created at this site, and
- in-channel bridge construction would be conducted during the summer when stream flows are low.

No mitigation is required.

Impact: Potential for Changes in Fish Habitat and Anadromous Fish Migration from Construction and Operation of the SR 237 Bypass

Under the SR 237 Bypass Option, existing levees on the east bank of SR 237 would be relocated and up to 6 bypass culverts would be constructed under the SR 237 bridge (as an option to bridge raising). Potential impacts on fisheries resources created by this option would include construction-related effects on fish habitat and fish-stranding issues in box culverts.

Bypass construction would occur adjacent to (but outside of) the existing low-flow channel in reach F; therefore, no temporary impacts on fish passage would be expected from bypass construction. Temporary construction-related effects on fish habitat would most likely be construction-site sedimentation and the possible release of construction contaminants in the construction area from operation of heavy equipment. These effects would be minimized by implementing the "environmental commitments" presented in chapter 2.

Depending on how the bypass culverts are designed, the migration of juvenile and adult fish would not be adversely affected by the change in flows in the lower Guadalupe River during periods when water enters the bypasses because the water depth necessary for migration would be maintained in the channel. When the bypass culverts begin operating, if the flow is greater than approximately 42.48 cms (1,500 cfs) in the main channel, flow in the main channel could be reduced but would not change enough to affect the water depths that steelhead and chinook salmon need for migration. The potential also exists for adult and juvenile steelhead to be swept downstream into the bypass culverts and possibly become stranded during receding flows; however, this potential is considered remote because the bypass culverts would extend for only a short distance (under the SR 237 eastbound lanes) and would be designed in a manner that does not create pools in the bypass culvert that could entrap fish during receding flows. The bypass would also operate infrequently and for short durations.

These potential impacts on fish habitat and migration are considered less than significant because construction would be temporary and minimized by standard environmental commitments. No mitigation is required.

Impact: Potential for Changes in Fish Habitat and Anadromous Fish Migration and Stranding from Vegetation and Sediment Management Activities in Reaches A–G

The sediment and vegetation management required to maintain the design channel capacity under the Proposed Project would require moderate to aggressive management, as described in chapter 2, "Proposed Project and Alternatives," and in chapter 6 of the Engineer's Report. Vegetation management that could potentially affect fish habitat includes removal of all vegetation within approximately 100 m (about 300 feet) downstream of I-880 in reach A and the removal of vegetation within 30 m (about 100 feet) of all other bridge approaches. Removal of streamside vegetation within 30 m (about 100 feet) of bridges is not expected to substantially reduce the amount of available fish habitat because streamside vegetation supporting SRA cover in those areas under existing conditions is minimal. Approximately 31.7 m (104 feet) of SRA cover, representing 0.9% of the total in the LGRP area, would be removed as a result of vegetation management at the bridges and in sediment management areas. This loss of streamside riparian habitat is extremely small, and SRA cover would most likely be offset by increases in future vegetation coverage within the 6.1-m- (20-foot-) wide low-flow channel buffer area (please refer also to the "Vegetation" section of this chapter). Periodic removal of this small amount of vegetation at the approaches to bridges would not create changes in lower Guadalupe River water temperatures and would not result in adverse conditions for fish or create a barrier to fish migration (please refer to the "Water Quality" section of this chapter).

Under the Proposed Project, sediment management in reaches B–E would involve the reexcavation of sediment management areas adjacent to a low-flow channel buffer area. Sediment excavation would not directly affect fish habitat in the low-flow channel because buffers would be maintained between sediment excavation areas and the low-flow channel. Sediment excavation in reaches B–E could lead to the stranding of fish, including anadromous fish, when floodwaters recede after a flood event if a connection between the excavated areas and the low-flow channel is not available. Fish stranding in floodplain habitats is a well-documented phenomenon and occurs when burrow pits or other similar natural or constructed depressions are inundated by floodwaters and quickly become isolated from the main channel as the floodwaters recede. The potential for fish stranding depends on many factors, including the timing and magnitude of floodflows, timing of fish migration, and fish behavior. Although the probability and magnitude of potential fish stranding that could occur in the LGRP area are unknown, the adverse impact that could result from stranding is considered a serious project condition that would be mitigated. Please refer to "Determination" and Mitigation Measure F-1 below.

It is proposed that vegetation would be managed in reaches A–F in designated vegetation management areas outside a minimum 6.1-m- (20-foot-) wide buffer on both banks of the low-flow channel. The west bank of reach C would not receive vegetation management treatments. Streamside vegetation, including SRA cover, that provides fish habitat would not be affected by vegetation management in these areas.

Proposed removal of vegetation and root masses in reach G would involve shallow excavation (1 m [3.28 feet] deep) immediately adjacent to new depressed maintenance roads in reach G and herbicide application in areas outside a 6.1-m- (20-foot-) wide buffer area on both banks of the low-flow channel; therefore, there would be no direct impacts on low-flow channel streamside vegetation, and no impacts on fish habitat would result from vegetation management in reach G. Resident or anadromous fish species in this reach of the lower Guadalupe River would not be directly affected by fish habitat changes but could potentially be stranded in excavated areas in a similar manner as described for sediment management areas.

Determination

Overall, vegetation management impacts on resident and anadromous fish species under the Proposed Project would be less than significant because removal of streamside vegetation at bridge approaches would be minor, and vegetation management would not affect streamside vegetation in other areas of reaches A–G because an established buffer area would be maintained adjacent to the low-flow channel.

Channel excavation that would be required for sediment removal in reaches B–E would also not affect streamside vegetation but could result in significant stranding impacts in excavated areas. Reach G excavation for vegetation removal would not affect streamside vegetation that supports fish but could result in significant stranding issues in excavated areas. The significant sediment/vegetation excavation impacts would be reduced to a less-than-significant level by the following mitigation measure.

Mitigation Measure F-1. Provide Fish-Passage Connection

To reduce the potential for the stranding of fish in sediment excavation areas, the District will provide a passive connection between the excavated channels and the low-flow channel in reaches B, C, D, E, and G or in other areas where excavations are proposed in the future, thereby ensuring that ponding in excavated areas is avoided. The low-flow channel connections will be located at the downstream end of sediment excavation areas and will be designed to prevent ponding in excavated areas by channeling water out of these areas and back to the main river. The District will grade these excavation sites so that they will drain completely as flows recede and will not result in depressions or areas of ponding.

Alternative 3: Channel Bank Modification

Impact: Potential for Changes in Fish Habitat from the Construction of Floodwalls and Channel Bank Modification Structures

Under the Channel Bank Modification Alternative, construction of flood-control facilities would create changes to fish habitat similar to those described for the Proposed Project. In reach A, the impacts from minor bank contouring and the placement of vortex rock weirs, and the construction of bridge-approach floodwalls, could lead to temporary sediment erosion or construction-zone spills at work sites.

In reach A, banks would be recontoured downstream of I-880, outside the low-flow channel and within approximately 30 m (about 100 feet) of the bridge approaches, as described for the Proposed Project. Reach A banks would be stabilized to ensure that they would not erode or otherwise fail during flood events. Construction activities would temporarily increase the amount of fine sediment in the stream; however, standard construction-area sediment control measures, as identified in chapter 2 under "Environmental Commitments," would minimize this potential impact.

In reach A, the potential impacts on fisheries resources from construction of up to 4 vortex rock weirs are the same as those described for the Proposed Project. The vortex weirs would stabilize the channel bottom, create plunge pools, and improve the pool/riffle sequence in this area. Construction may increase the amount of fine sediment in the low-flow channel, which could affect fish habitat. These structures are expected to create only minor impacts on fish habitat for the same reasons as described for the Proposed Project.

Vortex rock weirs would not affect SRA cover and would not create a change in lower Guadalupe River water temperatures that could adversely affect fish.

In reaches D–G, construction of channel bank modification structures would have no effect on fisheries resources because these structures would not require construction in or near the low-flow channel and would have only minor impacts on perennial and seasonal wetland habitat. Minor impacts on sedimentation in the overbank areas could result from construction but could be minimized by standard construction-area sediment control measures, as identified in chapter 2 under "Environmental Commitments." Water velocity and stream depth in areas of the channel containing fish habitat would not be affected by this alternative. Channel morphology of the low-flow channel would also not be affected by the channel bank modification structures, although the width of overbank areas would be increased for flood conveyance capacity.

These potential impacts are considered less than significant because construction of structures under this alternative would have minimal effects on streamside vegetation or low-flow channel conditions. No mitigation is required.

Impact: Potential for Changes in Fish Habitat and Anadromous Fish Migration from the Relocation of the Hetch Hetchy Aqueduct

Under the Channel Bank Modification Alternative, the relocation of the invert structures of 2 Hetch Hetchy pipelines could be required before construction could begin on the channel bank modification structures at this location. Pipeline construction would require trenching across the low-flow channel and could temporarily affect small areas of fish habitat in the approximately 40-m- (131-foot-) wide construction zone. Potentially, the pipeline construction could also affect migration of anadromous fish species, including chinook salmon and steelhead, if construction were to occur during fish migration periods. Fish-management criteria for the construction area, as described in chapter 2 under "Environmental Commitments," would be followed to minimize the effect on migrating anadromous fish. The District would relocate and construct pipelines in the vicinity of the low-flow channel during summer months, when streamflows are low, water temperatures are high, and the conditions for fish migration are less than desirable. In addition, construction would not be allowed in the low-flow channel during periods when special-status anadromous fish are known to migrate. A construction-site flow bypass of the low-flow channel would also be constructed to maintain continuous flow in the channel during construction. Subject to the implementation of the environmental commitments for the construction site, this impact is considered less than significant. No mitigation is required.

Impact: Potential for Changes in Fish Habitat and Anadromous Fish Migration and Stranding from Vegetation and Sediment Management Activities in Reaches A–G

The sediment and vegetation management required to maintain the design channel capacity under the Channel Bank Modification Alternative would require moderate to aggressive management as described in chapter 2, "Proposed Project and Alternatives," and in chapter 6 of the Engineer's Report. Vegetation management that could affect fish habitat is the same as described for the Proposed Project in bridge approach areas, vegetation management areas, and sediment excavation areas. The impacts on fish habitat for these activities are considered less than significant because channel management activities would generally be allowed only outside a low-flow channel vegetated buffer area except at bridge approaches. Impacts on fish stranding from sediment excavation in reaches B–E and vegetation removal areas in reach G are considered significant for the same reasons identified for the Proposed Project. The following mitigation measure would reduce the potential stranding impact to a less-than-significant level.

Mitigation Measure F-1. Provide Fish-Passage Connection

This mitigation measure is described in detail above under the Proposed Project.

Alternative 4: Channel Bypass

Under the Channel Bypass Alternative, impacts on fisheries resources in the lower Guadalupe River and downstream of the LGRP area would be similar to those identified for the Proposed Project. This alternative would result in slightly greater construction impacts within and adjacent to existing levees than under the Proposed Project, but it would require a similar level of initial vegetation and sediment management and routine maintenance that would have approximately the same impact on streamside vegetation that support fish species.

Implementation of the bypass culverts could require hardening of channel areas near inlet and outlet weirs to account for increases in flow velocities at these locations when the bypass culverts are operating. This need for hardscaping could have a greater impact on fish habitat near the low-flow channel than that identified for the Proposed Project. In addition, fish migration issues and stranding potential under the Channel Bypass Alternative would be greater than under the Proposed Project because of the potential for fish to be drawn into 2 bypass culverts (approximately 7,400 m [24,280 feet] in the west levee and 4,700 m [15,420 feet] in the east levee).

It is unlikely that steelhead and chinook salmon would enter the bypass system; however, if they were drawn into the box culverts, they could be stranded during receding flows. This potential for stranding could only be reduced by designing the bypass culverts to avoid the formation of pools and by regularly removing sediment before winter. Bypasses would also need to be designed to avoid reducing flows in the main river channel to less than levels necessary to ensure fish migration.

Baylands Mitigation Measure

Impact: Potential for Changes in Fish Habitat and Anadromous Fish Migration from the Baylands Mitigation Measure

The Guadalupe River discharges into Alviso Slough. Under existing conditions, Guadalupe River floodflow periodically overtops the levees in several locations along Alviso Slough, inundating the Cargill Salt Ponds and the city of Alviso. Flow over the levees potentially diverts fish into areas disconnected from Alviso Slough after floodflows recede. Steelhead and chinook salmon stranded in disconnected areas may be permanently isolated from the population and subsequently die.

The Baylands Mitigation Measure to reduce flooding effects of the LGRP project (chapter 2) would include vegetation management to ensure flood conveyance in Alviso Slough and improvements to the existing levee on the east bank of Alviso Slough to prevent flooding in the city of Alviso. An inlet weir on the levee along the west bank of Alviso Slough would be designed to maintain existing peak discharges in Alviso Slough and maintain spill to the Cargill Salt Ponds at the existing levels. The weir would also protect the levee from the potential of breaching and would more safely and efficiently divert floodflows away from Alviso Slough and into the salt ponds west of Alviso Slough. The 305-m- (1,000-ft-) long inlet weir along Alviso Slough would be located immediately across from Alviso in the same general location as an existing natural low spot in the Cargill levee. The construction footprint of this structure, including entrance and exit aprons, is approximately 15.2 by 305 m (50 by 1,000 ft).

The proposed inlet weir to the salt ponds would begin spilling when flow in Alviso Slough reaches approximately 193 cms (6,800 cfs). Hydrologic data for water years 1930–2000 indicate that Guadalupe River flow equal to or exceeding 193 cms (6,800 cfs) only occurs infrequently. During 1972–2000, more representative of existing watershed conditions than earlier years, 6 of the 29 years had peak flows that equaled or exceeded 193 cms (6,800 cfs). The duration of peak flows exceeding 193 cms (6,800 cfs) is generally less than 24 hours. The data do not indicate the frequency of flows during any 1 year, but flow exceeding 193 cms (6,800 cfs) generally occurs during January, February, and March. The volume of flooding in the salt ponds during infrequent events would be greater than under existing conditions.

Adult chinook salmon are not likely to be present during January–March when weir overflow may occur. Effects on adult steelhead would likely be minimal because adults would be moving upstream and would remain in the main channel. Outmigration of juvenile steelhead and chinook salmon occurs from December through June and juveniles of both species could be diverted with floodflow over the newly constructed weir and stranded in the Cargill Salt Ponds during January–March. Given the timing and short duration of floodflow exceeding 193 cms (6,800 cfs), it is likely that a relatively minor proportion of outmigrants would be affected in any 1 year.

The operation of the weir on the west levee could increase the potential number of juvenile chinook salmon and steelhead that would have been stranded in the salt ponds under existing conditions. However, the Baylands Mitigation Measure, including the raising of the east levee, vegetation management to maintain Alviso Slough conveyance, and construction and operation of the weir on the west levee, would prevent stranding that would have resulted from the flooding of Alviso. Furthermore, the LGRP would reduce the frequency of floodflow that overtops the lower Guadalupe River levees below I-880, thereby reducing the potential that currently exists for stranding juvenile steelhead and chinook salmon in those overbank areas. Although the volume of water spilling into the salt ponds would increase with the Proposed Project, stranding of fish diverted with floodflow over the entire project area would continue to occur at levels lower than existing condition levels.

Juvenile chinook salmon and steelhead stranded in the salt ponds following flood events may not survive. Factors influencing the survival of juvenile steelhead and chinook salmon include salinity, dissolved oxygen, water temperature, food availability, predation by piscivorous birds, and frequency and duration of flood events. The water quality in flooded ponds, especially salinity, depends on the concentration prior to flooding, which may vary from year to year in response to previous flooding and the initial volume of water in the ponds. Given the low frequency and short duration of flood events that overtop the weir, opportunities for stranded fish to reenter the river before floodflows recede are unlikely.

Juvenile chinook salmon and steelhead that survive in the salt ponds following flood events may reenter the river with water that leaves the salt ponds as part of water management operations. Future water management operations would consist of actively pumping using pumps that are screened in a manner consistent with the NMFS Fish Screening Critieria for Anadromous Salmonids.

The volume of floodflows that enter the salt ponds under the LGRP (with and without the Baylands Mitigation Measure) would not be materially different from the volume of floodflows that spill into the streets and/or ponds under existing conditions; therefore, the impact of the Proposed Project on anadromous fish stranding with and without the Baylands Mitigation Measure would be less-than-significant.

~~Implementation of the Baylands Mitigation Measure could include minor changes to fish habitat at and upstream of the proposed inlet weir and in the vegetation management area downstream of the UPRR during construction of these facilities; however, these potential impacts on fish habitat would be less than significant because of the minor amounts of habitat that could potentially be affected.~~

~~Construction of a controlled inlet weir on Alviso Slough would be operated to direct a portion of the design floodflows into the Cargill Salt Ponds. Design floodflows are expected to occur at a time when anadromous smolts may be emigrating to the ocean. The potential for delayed migration or~~

~~entrapment of fish in the salt ponds is dependent on a number of variables, including the frequency and duration of bypass flow, the coincidence of bypass flow with the migration timing of adult and juvenile fish, and the behavior of adult and juvenile chinook salmon and steelhead. Furthermore, the number of juvenile fish drawn into the ponds depends on the population abundance of juvenile fish migrating downstream when the ponds are flooding and the relative proportion of lower Guadalupe River flows entering the ponds during a flood event. Unless an adequate connection to Alviso or Guadalupe Sloughs is maintained in the baylands ponds, chinook salmon and steelhead diverted into the ponds may experience delays in migration or become stranded as floodflows in ponds recede.~~

~~Flooding of the salt ponds under this mitigation measure would occur in the winter when juvenile chinook salmon are in the river. The proposed inlet weir would begin spilling when Alviso Slough flows reach approximately 193 cms (6,800 cfs). The potential impacts on migrating chinook salmon and steelhead are anticipated to be minimal because flooding of the ponds would occur infrequently and for short durations. An analysis of daily peak flows determined that during the 1972–1999 period (U.S. Geological Survey 1999), Guadalupe River flows equaled or exceeded the weir design flow of 193 cms (6,800 cfs) on only 6 days, approximately 0.1% of the total days occurring during the 6-month rainy season. The frequency of flooding in the salt ponds would be similar to existing conditions; therefore, the impact of the Proposed Project on anadromous fish stranding with and without the Baylands Mitigation Measure would be less than significant. Increased floodflows diverted to the salt ponds would not substantially increase the potential for fish stranding with this mitigation measure because volumes in the Cargill salt ponds under the Proposed Project with the Baylands Mitigation Measure would not be substantially greater than under existing conditions; any fish that are diverted into the ponds would have the same opportunity as under existing conditions to escape to Alviso and Guadalupe Sloughs.~~

Land Use and Planning

Jurisdiction and Ownership

The LGRP area (reaches A–G) is within the city limits of San Jose and Santa Clara. Reaches A, B, and G are entirely within the city limits of San Jose; the San Jose/Santa Clara city limit line extends along the lower Guadalupe River from reaches C through F, with San Jose on the east side and Santa Clara on the west side. San Jose is divided into 11 planning areas. Reaches A–F are within the north San Jose planning area, and reach G is within the Alviso planning area.

Most of the lower Guadalupe River within the levee is owned by the District; however, there are a few areas where the river is part of an older parcel owned by the City, SCCTD, or another entity, in which case the District has an easement. For example, reach A is owned by the San Jose International Airport, and the District has an easement. The District has land rights within the river ROW overall. (Tippets pers. comm.)

The land adjacent to the river is owned by various private and public entities, including the City, the City of Santa Clara, and the State of California. Ownership of vacant parcels is included in the discussion of existing land uses below and in table 3-18.

Existing Land Uses Adjacent to the River

There are continuous, unpaved maintenance roads or pathways on top of the levees on each side of the river from reach A through reach G. Most maintenance roads are accessible and used by walkers, joggers, and bicyclists.

Generally, the urban area surrounding the LGRP study area has been built adjacent to the toe of the levees, and the existing land uses adjacent to the east and west levees include industrial, commercial, residential, recreational, and undeveloped open space.

Reach A

The west side of the river is dominated by the San Jose International Airport. Airport Boulevard extends along the entire length of the lower Guadalupe River in this reach. At the north end, the Rocky Pond detention basin is used to store water pumped from the high-water table that leaks into the airport terminal area. There is also a drive-through water spout so the water can be used for airport irrigation, dust suppression, and other needs. In the middle of reach A, just south of the new Skyport Drive bridge, the temporary land uses include an approximately 30-space, paved parking lot and a construction staging area (vehicle and equipment storage). At the south end, there is a Pacific Gas and Electric Company (PG&E) substation where electrical lines go underground. Land uses west of Airport Boulevard include the terminals and other airport-related uses, such as rental car and air freight areas, ACM Aviation, offices for U.S. Customs and the San Jose Police Department Airport Division, Sky Chefs airline food service, offices, warehouses, and airplane hangars. (Greene pers. comm.)

The east side of the river is dominated by SR 87 (Guadalupe Parkway), which extends the entire length of this reach. The only land use between SR 87 and the river is the airport's new car rental complex at the far northern end. Caltrans is expanding SR 87; construction is expected to be completed by 2004 (Enjily pers. comm.). Land uses east of SR 87 and north of Skyport Drive are dominated by offices and related commercial uses. Land uses south of Skyport Drive include the American Musical Theater, the Santa Clara County Social Services Agency, and a single-family residential neighborhood.

Reach B

There are vacant lots on both sides of the river at the south end of reach B near U.S. 101. The vacant lot on the west side is owned by the City and is zoned for industrial park use. The San Jose Airport Department plans to construct a fuel storage facility during 2001 (see "Planned Land Use and Projects Adjacent to the River" below). A sliver of the vacant land along the lower Guadalupe River is owned by the City of Santa Clara and zoned for agriculture. The vacant lots on the east side of the lower Guadalupe River are zoned for industrial park (planned development) use and are approved for research and development use, but no formal applications have been submitted to the planning department (Moore pers. comm.).

The north end of reach B is surrounded by industrial uses on both sides of the levees. Several small, light-industrial businesses are on the west side, and a Hewlett-Packard office complex is on the east side.

Table 3-18. Undeveloped/Open Properties Within Project Limits

Owner - Location - City	APN - Reach	Area (km^2)	General Plan	Zone	Water-front * (m)	Comments
Properties located on the east side of the river						
Sainte Claire Corp. - between Gold Street and the UPRR - San Jose	15-41-006 Reach G	2.99478	Mixed	Use C-2	115	
Sainte Claire Corp. - located north (downstream) of SR 237- San Jose	15-39-020 Reach G	42.00786	Mixed Use		420	No new permit applications have been processed to date. No tentative map.
State of California - northeast corner of intersection with SR 237 - San Jose	15-39-014 Reach G	26.98135	Combined Industrial	M-4	131	No new permit applications have been processed to date.
Sylvia Charles J Trust PT - southeast corner of intersection with SR 237 - San Jose	97-01-028	9.18669			206	
Sylvia Charles J Trust PT - located south of SR 237 - San Jose	97-02-042 Reach F	17.64492	Open Space	A (PD)	172	This property is designated as open space from the adjacent development to the north.
Hyundai - northeast corner of intersection with Montague - San Jose	97-06-035 Reach D	46.5405	Industrial Park I		217	No new permits have been processed.
Agilent Tech. (Hewlett Packard) - located north (downstream) of U.S. 101 - San Jose	97-25-068 97-45-021 Reach B	162.9727 223.4349	Industrial Park	IP-b (PD)	107	A tentative map was filed in 1994 for lot reconfiguration. There is an approved "Planned Development" for research and development use.
Atmel Corp - northeast corner of intersection with U.S. 101 - San Jose	97-25-011 97-25-078 (No LGR Frontage; 101 Frontage = 52 m) Reach B	24.07965 34.56138	Industrial Park	IP-b (PD)	660	A tentative map was filed in 1991 on Lot 078. Lot 078 has no river frontage but is contiguous with Lot 011. There is an approved "Planned Development" for research and development use.
City of San Jose - southwest corner of intersection with U.S. 101 - San Jose	230-01-042 Reach A	68.67759			794	
Properties located on the west side of the river						
SCVWD - southwest corner of intersection with UPRR between UPRR and Gold Street - San Jose	15-34-062 Reach G	None provided	Mixed Use	A (PD)	20	

Table 3-18. Continued.

Owner - Location - City	APN - Reach	Area (km^2)	General Plan	Zone	Water-front * (m)	Comments
Lincoln 237 Associates LP - southwest corner of intersection with Gold Street - between UPRR and Gold Street - San Jose	15-34-063 Reach G	None provided	Mixed Use	A (PD)	53	Tentative map PT97-11-133 filed in 1997. Currently under construction.
State of California - southeast corner of intersection with Gold Street - Santa Clara	15-34-019 Reach G	2.26632	Parks/ Open Space		62	Vacant lot. No plans submitted.
Santa Clara Valley Water District - north	15-34-51 Reach G	None provided			335	Strip along waterfront (see below).
Trans County Transport/Santa Clara County Transit District - Santa Clara	15-34-076 15-34-075 Reach G	12.141 5.2611	Parks/ Open Space		174 277	Undeveloped open space with detention pond. These parcels have no river frontage, but are adjacent to Lot 51 reference above.
City of Santa Clara - southwest corner of intersection with SR 237- Santa Clara	97-01-069 97-01-068 Reach F	195.1059	Urban Res. Parks and Rec	B	361 3	Both properties (landfill -069 and golf course -038) are adjacent and listed together. Opportunity exists to identify remediation sites and begin negotiation with the City. No tentative map has been filed to date. These properties should be considered vacant.
City of Santa Clara (Sports and Open Space Authority) - south of Tasman - Santa Clara	97-05-104 97-83-001 97-83-002 (not found) Reaches D and E	148.7192 45.85251 30.71673			172 376	
State of California - northwest corner of intersection with Montague - Santa Clara	97-08-023 97-08-045 Reach D	21.97521 57.79116	Mixed Use Commercial Residential	B	153 150	Both properties are under negotiation for sale to Sun Microsystems and represent current opportunity for remediation sites. Per the City of Santa Clara planning staff 5/26, the Rivermark project is in the design phase and would include single family homes, elementary school, fire station, library, and commercial. No formal application submitted.

Table 3-18. Continued.

Owner - Location - City	APN - Reach	Area (km^2)	General Plan	Zone	Water-front * (m)	Comments
						No application/plans were submitted for Lot 045, and it is unknown if it will be a part of the Rivermark project. Potential staging area on both lots.
City of Santa Clara - north of California U.S. 1 and San Jose property - Santa Clara	97-25-023 Reach B	None provided		Agric	16	
City of San Jose - northwest corner of intersection with U.S. 101 - San Jose	97-25-051 Reach B	None provided	Industrial Park	IP	388	San Jose International Airport is constructing a new fuel storage facility, consistent with its approved master plan. Construction likely to continue through 2001. Potential staging area.

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* Approximate contiguous river frontage.

Rev. June 6, 2000, with info from Kate Giberson, Jones and Stokes.

Reach C

The dominant land use on both sides of the lower Guadalupe River in reach C is industrial. The east side of the lower Guadalupe River is occupied by large industrial complexes (i.e., Altos Computer Systems, Kaiser Aerospace Electronics, and Renco Associates). There is also a City water tank on the triangular-shaped parcel at the far southern end on Trimble Road.

The west side is dominated by Viking Freight Systems at the lower Guadalupe River bend, and several smaller industrial businesses. There is a single-family residential area at the northern end near Montague Expressway. Utility substations include a City of Santa Clara facility just south of the residential neighborhood and another facility at the corner of Laurelwood Road and Victor Street (possibly associated with Viking Freight Systems). There are no vacant parcels along reach C.

Reach D

On the east side of the lower Guadalupe River in reach D are several large industrial complexes consisting of offices and warehouses (i.e., Hyundai Electronics, Valley Transit Authority, Pacific Bell, Fujitsu, NEC, and KLA Tencor). There is also the City's River Oaks water pump station and detention basin midway along the east side, and a vacant 12-acre lot at the south end. The vacant lot owned by Hyundai Electronics is zoned for industrial use; there are no applications currently submitted (Moore pers. comm.).

On the west side of the river are 2 large residential complexes. The Mansion Grove Apartments at the lower Guadalupe River bend surround the historic James Lick mansion and include recreational facilities near the river (tennis and basketball courts, batting/golf driving cage, playground, picnic area). The Carlyle is a gated, higher density, residential area at the north end of the reach, between 2 undeveloped areas. The City of Santa Clara Fairway Glen storm station is located adjacent to the Hetch Hetchy Aqueduct (a City/County of San Francisco facility).

There are 3 vacant areas along the west side of this reach. At the far northern end between Hetch Hetchy Aqueduct and the Carlyle residential complex, the City of Santa Clara owns undeveloped open space designated for parks and recreation. South of the Carlyle residential area, the State of California owns a large undeveloped parcel designated for mixed use. The southernmost vacant parcel is adjacent to Montague Expressway. The 2.43-hectare (6-acre) parcel is owned by a private developer who has not yet submitted an application, but has presented the Rivermark project to the planning department (see "Planned Land Uses and Projects Adjacent to the River" below).

Reach E

The east side of the lower Guadalupe River is dominated by parking lots and several buildings occupied by Cisco Systems. The west side of the lower Guadalupe River is occupied by undeveloped open space owned by the City of Santa Clara. The City of Santa Clara Parks and Recreation Department and the Santa Clara County Open Space and Sports Authority have developed the Ulistac Natural Area. This 40-acre natural area will have pathways for use by the public for walking, jogging, and biking, with connecting ramps to the west levee of the lower Guadalupe River for access to the levee pathways. (Yee pers. comm.)

Reach F

The east side of the lower Guadalupe River is dominated by residential uses. There are several multistory residential complexes at the south end, and the San Jose Mobile Home Park at the north end. The City's Oak Mead storm pump station is adjacent to the levee between the mobile home park and the multistory residential complexes. Sylvia Lake and a vacant lot are also adjacent to the levee and the mobile home park. The vacant lot is an approximately 500- by 100-foot strip of land with a basketball court that is part of the mobile home park.

Land uses on the west side of the lower Guadalupe River include industrial/business offices at the south end and recreational uses in the middle. The City of Santa Clara Golf and Tennis Club golf course extends along the middle stretch of this reach. The old city landfill is located north of the golf course and is currently used for BMX motorbike racing. Both the old landfill and the golf course are on top of a hill with surrounding vacant land sloping down toward the river. The City of Santa Clara East Side storm pump station and retention basin are at the far northern end, adjacent to SR 237.

Reach G

The northeast side of the lower Guadalupe River is dominated by open space, the Pinhigh Family Golf Center (driving range and restaurant), and heavy industrial uses (primarily auto-related storage and repair). The northwest side of the river is dominated by open space and the Sommerset mobile home park, which is surrounded by new industrial office park development. The land near the UPRR tracks south of the lower Guadalupe River is being developed for office and commercial uses.

There is undeveloped open space with ponds on both sides of the lower Guadalupe River at the south end of this reach near SR 237. The State of California owns the land on the east side of the lower Guadalupe River, which is designated as public park/open space and combined industrial/commercial. The SCCTD owns the land on the west side of the lower Guadalupe River, which is designated as both public park/open space and industrial park with mixed industrial overlay. (Moore pers. comm.) The lands owned by the SCCTD are wetlands that were created as mitigation for the Tasman Corridor Project in 1999 (Bobadilla pers. comm.).

Vacant Parcels and Planned Land Uses and Projects Adjacent to the River

The undeveloped or vacant parcels adjacent to the river in the LGRP study area are listed in table 3-18, which includes the location, property owner, assessor's parcel number (APN), land use and zoning designations, and any known information on planned land uses. Some of this information is also included in the previous discussion under "Existing Land Uses Adjacent to the River." Vacant parcels may provide opportunities for staging areas during project construction and ultimately streamside restoration, remediation, or improvements to hydraulic properties of the river.

Based on information obtained from San Jose and Santa Clara city staff (Greene, Moore, Martin, and Riley pers. comms.), the planned land uses are discussed by reach from I-880 downstream to the UPRR tracks in Alviso.

Reach A

Caltrans SR 87 Expansion. Caltrans is in the process of widening SR 87 (Guadalupe Parkway) from 4 lanes to 6 lanes to relieve traffic congestion and improve access to downtown San Jose. Between 6.1 and 7.6 m (20 and 25 feet) of fill will be used to elevate the 6-lane SR 87 (Enjily pers. comm.). As part of this project, Caltrans is also building a retaining wall on the east side of the riverbank from I-880 to just north of the San Jose International Airport (Ng pers. comm.). The SR 87 expansion requires that riparian habitat be planted adjacent to the east side of the Guadalupe River and that wetlands be established to mitigate the impacts on these habitats caused by the project. The target date for completion of the SR 87 Freeway Upgrade Project is December 2001 (Enjily and Greene pers. comms.).

San Jose Airport New Rental Car Garage. Airport Master Plan Project S-3 includes construction of an 8-level rental car garage with 10,000 spaces on the former Green Long-Term Public Parking Lot site for consolidated rental car ready/return and storage, including an open area for fueling, washing, and maintenance, and a 2-lane bridge across the Guadalupe River to the rental car garage. The purpose of this project is to allow consolidation of the dispersed rental car agencies and provide space for more hourly parking near the terminal. The project is part of the approved Airport Master Plan, and mitigation of impacts on the river was addressed in the 1997 master plan EIR (City of San Jose 1997). Project design is in process and construction is likely to begin in 2002 and continue through 2004 (Greene pers. comm.).

Elevated Automated People Mover. The City has proposed the construction of an Electronic Automated People Mover (EAPM) that would cross the Guadalupe River in reach A. The purpose of the EAPM would be to transport passengers from the San Jose International Airport terminals to the Guadalupe Light Rail Transit that runs down North First Street in San Jose. The project is planned to be an east-west single-track alignment that would cross 18.3 m (60 feet) above the river and be roughly 914.4 m (3,000 feet) long and 4 m (13 feet) wide. The project is proposed to be completed in 2006.

New Green Island Bridge

The New Green Island Bridge project is a proposed 2-lane crossing downstream of Airport Parkway and upstream of the existing Green Island Bridge. Construction is projected to begin in 2002. Currently, the Green Island Bridge is a 2-lane crossing that provides access from the San Jose International Airport to the car rental facility located at the area formally known as Green Island. When the New Green Island Bridge is complete, vehicles will be routed in a circular traffic pattern. One bridge will provide access from the car rental facility to the airport, and the other will provide access from the airport to the car rental facility (Hessler pers. comm.).

Reach B

San Jose Airport New Fuel Storage Facility. Airport Master Plan Project S-1 includes construction of a 1.01-hectare (2.5-acre) fuel storage facility consisting of 4 tanks with a capacity of approximately 7.57 million liters (2 million gallons) on the vacant parcel north of U.S. 101 and west of the Guadalupe River. Project design is in process, and construction could continue through 2001. The project is part of the approved Airport Master Plan, and mitigation (i.e., setback from the river and fuel containment) was addressed in the 1997 master plan EIR (City of San Jose 1997). (Greene pers. comm.)

Reach D

Rivermark Project. The approximately 2.4-hectare (6-acre) vacant parcel immediately north of Montague Expressway and south of the Mansion Grove Apartments, and the approximately 5.7-hectare (14-acre) site just north of the Mansion Grove Apartments are in the process of being purchased from the State of California by a private developer ~~(Sun Microsystems),~~ who wants to develop the Rivermark project, which would include this parcel. The Rivermark project comprises single-family homes, an elementary school, fire station, library, and commercial uses. The project could support 7,000–9,000 people and is consistent with Santa Clara's general plan and zoning designations. Although no formal application has been submitted, the developer has presented conceptual plans to city planning staff (Martin, Riley pers. comms.)

Reach E

Ulistac Natural Area. The City of Santa Clara Parks and Recreation Department and the Santa Clara County Open Space and Sports Authority have begun developing a 16.2-hectare (40-acre) natural area between Tasman Drive and the Hetch Hetchy Aqueduct on the west side of the river called the Ulistac Natural Area. This area will preserve the native vegetation within the area and will include trails throughout the area for walking, running, nature viewing, and biking, with connecting ramps leading to the pathway along the west levee of the river. (Yee pers. comm.)

Reach G

Legacy Terrace Project. The Legacy Terrace project is located near the UPRR tracks at the former Cargill landfill (also known as the SR 237 landfill) site west of Gold Street, between lower Guadalupe River and SR 237. The land is currently owned by Legacy Partners (formerly by Lincoln Property). The Legacy Terrace project divides the site into 3 parts. The south campus area (approximately 15.7 hectares [38.8 acres]) includes the construction of 5 commercial buildings (92,900 m^2 [1 million square feet] of office space), a 175-room hotel, and associated parking. The riverfront commercial area (approximately 2.6 hectares [6.4 acres]) includes areas near the Guadalupe River that will be used for restaurant, retail, or community facilities. The open space preserve (approximately 102.4 hectares [25.3 acres]) will be located on the north portion of the project site, adjacent to San Tomas Aquino Creek and the salt ponds. (H.T. Harvey & Associates 1999). A specific plan was drafted and the public review period for the draft EIR ended December 6, 1999; however, the city approval process has not begun (Corliss pers. comm).

Lincoln/SR 237 Assemblage. This project site includes the strip of land bounded by Gold Street on the west, UPRR tracks on the east, lower Guadalupe River on the north, and SR 237 on the south. This was also analyzed as parts 3 and 4 of the SR 237 Assemblage project (H.T. Harvey & Associates 1997b). Parts 1 and 2 are the Legacy Technical Park across Gold Street. Current planned uses are a research and development facility and restaurant.

Lower Guadalupe River Road Crossings. According to the *Valley Transportation Plan 2020*, there are plans and funds to expand the Trimble Road bridge that crosses the lower Guadalupe River. Additional future projects within the LGRP area include expanding the Montague Expressway and I-880 bridges, constructing a bridge over the lower Guadalupe River at the SR 87/U.S. 101 interchange, and constructing a bike path over the river near the River Oaks development between Montague Expressway and Tasman Drive (Ristow pers. comm.).

General Plan Land Use and Zoning Designations

Land use and zoning designations for the LGRP area described in the general plans of the Cities of San Jose and Santa Clara are briefly discussed below. The general plan land use designations are used to guide future development and correspond with development guidelines and policies contained within the general plan. A general plan is an adopted statement of policy for the physical development of a community. As such, it represents the official policy regarding the future character and quality of development.

Within the San Jose city limits, the general plan land use designation for the lower Guadalupe River is public park/open space. This designation applies to lands that are publicly owned and devoted primarily to open-space use. The lower Guadalupe River does not have a similar zoning designation. Zoning designations are extended from the adjacent land use to the middle line of the lower Guadalupe River. Because San Jose is a charter city, the zoning does not have to match the general plan designation; however, zoning designations that are inconsistent with the land use designation must be rezoned for consistency with the general plan when property is transferred or permitted (Moore pers. comm.).

Within the Santa Clara city limits, the general plan land use designation for the lower Guadalupe River is open space. This designation pertains to any parcel or area of land or water that is essentially unimproved and devoted to open-space use, including the banks and creek channels of the lower Guadalupe River. In Santa Clara, the zoning designations are extended from the adjacent land use. Santa Clara, like San Jose, is a charter city. The land use designations and zoning designations are generally consistent throughout the river, but there are some minor variations. These areas will be rezoned to be consistent with the general plan land use designations when property is transferred or permitted (Riley pers. comm).

Relevant Planning Documents and Policies

The planning documents relevant to the LGRP are generally described below, and relevant policies from these documents are listed in table 3-19.

The District Ends Policy

The mission of the District is to provide healthy, safe, and enhanced quality of living in Santa Clara County by comprehensively managing water resources in a practical, cost-effective, and environmentally sensitive manner. On September 28, 1999, the board of directors adopted new language as new "Ends Policy E-1 Board Direction" to the Chief Executive Officer/General Manager (CEO/GM) and "Governance Process LGP-1 Board Governance." Specific language of the new Ends Policy available at www.scvwd.dst.ca.us/fyi/BRD-MIN/092899.htm includes the following:

1. There is a healthy and safe environment for residents and visitors.
    1.1 There is a reliable supply of healthy, clean drinking water.
    1.2 There is reduced potential for flood damages.
2. There is an enhanced quality of life in Santa Clara County.
    2.1 Watersheds, streams, and the natural resources therein are protected and when appropriate, enhanced or restored.
        2.1.1. Healthy creek and bay ecosystems are protected, enhanced, or restored as determined appropriate by the Board.
    2.2 There are additional open spaces, trials, and parks along creeks and in the watersheds when reasonable and appropriate.

City of San Jose 2020 General Plan

The San Jose general plan represents the City's assessment of the amount, type, and phasing of development needed to achieve the City's social, economic, and environmental goals. It was developed with the participation of all City departments and the community, and is designed to be used by the community as the policy framework for decision making on both private development projects and City capital expenditures. The general plan seeks to balance the community's need for flood protection with the need to preserve San Jose's remaining riparian corridors, and it directs the City to cooperate with the District to improve flood protection facilities. The general plan includes policies for parks and recreation and for trails and pathways. In general, these policies are intended to enhance the livability of the urban environment by providing parks and a network of trails and pathways, and by preserving significant natural, historical, scenic, and other open-space resources. (City of San Jose 1994a.)

The LGRP area is part of the General Plan Scenic Routes and Trails program and is planned for future Class 1 trail development on the east levee.

City of San Jose Alviso Master Plan

The Alviso Master Plan elaborates on the San Jose 2020 General Plan and sets clear direction for future land use development within Alviso. The Master Plan focuses on the land within the Urban Service Area, which includes all of reach G and the baylands in the LGRP area. The purpose of the master plan is to protect and enhance the small-town quality of Alviso with goals, policies, and implementation measures that guide appropriate new development, community facilities, infrastructure, and beautification (City of San Jose 1998b).

City of San Jose Rincon De Los Esteros Redevelopment Plan, Twenty-Third Amended

The redevelopment plan conforms to the City of San Jose 2020 General Plan and is intended to promote industrial growth in northern San Jose. The redevelopment area includes most of the LGRP area (reaches A–F), but not the area north of SR 237 (reach G). The primary goal of the redevelopment plan is to

- strengthen the economic base of the project area by providing assistance to stimulate new commercial, industrial, and office expansion;

Table 3-19. Policies Relevant to the Lower Guadalupe River Flood Protection Project

Page 1 of 4

Document	Policies and Programs
City of San Jose 2020 General Plan (City of San Jose 1994a)	■ Flooding Policy 3: Designated floodway areas should be preserved for nonurban uses.
	■ Flooding Policy 4: The City and the Santa Clara Valley Water District should cooperate to develop flood control facilities to protect the Alviso and North San Jose areas from the occurrence of the or 100-year (1% of occurring in any given year) flood.
	■ Flooding Policy 8: The City should cooperate with the Santa Clara Valley Water District to develop additional flood control retention facilities in areas where existing retention facilities are nearing capacity.
	■ Level of Service Policy 12: New projects should be designed to minimize potential damage due to storm waters and flooding to the site and other properties.
	■ Level of Service Policy 13: In designing improvements to creeks and rivers, adjacent properties should be protected from flooding.
	■ Level of Service Policy 14: The "modified floodplain design" is the preferred design for future flood control facilities. The "widen-one-bank" and "trapezoidal channel" designs should only be used when funding or right-of-way limitations make the use of the modified floodplain design impractical.
	■ Level of Service Policy 15: The City should continue to cooperate with other public and private jurisdictions and agencies to coordinate emergency response and relief efforts in case of flooding.
	■ Natural Resources Policy 2: Creeks and riparian corridors should be preserved when possible, or restored when disturbance cannot be avoided.
	■ Parks and Recreation Policy 7: The City encourages the Santa Clara Valley Water District, school districts, the Pacific Gas and Electric Company, and other public agencies and utilities to provide for appropriate recreational uses of their respective properties and rights-of-way. Consideration should be given to cooperative efforts between these entities and the City to develop parks, other open space areas, and recreational facilities and programs.
	■ Parks and Recreation Policy 13: Bikeways, hiking trails, equestrian trails, rest areas, and picnicking accommodations should be provided, wherever feasible, within parks and trails corridors designated on the Scenic Routes and Trails Diagram, to access the hillsides, ridgelines, baylands, significant waterways, and other scenic areas.
	■ Trails and Pathways Policy 3: Design, construction, and management of trails and pathways should be carefully executed in order to minimize environmental disturbance.
	■ Trails and Pathways Policy 4: Bridges and other public improvements within designated Trails and Pathways Corridors should be designed to provide safe and secure routes for trails, including grade separation of roadways and trails whenever feasible.
	■ Trails and Pathways Policy 5: The City should promote cooperative interagency planning of pathways, bikeways, and equestrian trails.

Table 3-19. Continued

Document	Policies and Programs
	■ Trails and Pathways Policy 6: The incorporation of trails and pathways into lanes used for public and utility purposes is encouraged. ■ Trails and Pathways Policy 8: In areas which are already developed and where insufficient right-of-way exists to provide trails separate from existing roadways, the City should consider interim trail alignments along public roadways to provide linkages with trail corridors and public transportation facilities. ■ Transportation Policy 41: A bikeway system linking residences, employment centers, schools, parks, and transit facilities should be developed to promote the use of the bicycle as an alternative mode of transportation for commuting, as well as for recreational purposes. ■ Transportation Policy 43: Priority improvements to the bikeway system should include bike routes linking light rail stations to nearby neighborhoods and bike paths along designated trails and pathways corridors. ■ Transportation Policy 46: Bicycle safety should be taken into consideration when implementing improvements for automobile traffic operations. ■ Transportation Policy 47: The City should cooperate with the County and other cities in designing and implementing a Countywide bikeways system. ■ Water Resources Policy 3: The City should encourage the Santa Clara Valley Water District to restrict public access and recreational uses on water-related lands when water quality could be degraded.
City of Santa Clara General Plan 1990-2005 (City of Santa Clara 1992)	■ Open Space Policy 28: Encourage multiple use of land such as schools, parking lots, utility easements, and flood control channels. ■ Sidewalks, Bikeways, and Trails, Program xxviii: Supports construction of the Bay Trail system within Santa Clara, including connector trails such as along Saratoga/San Tomas Aquinas Creek and the Guadalupe River. ■ Water Resources Policy 14: Support flood control improvements that will reduce serious flood hazards in the City, through coordination with the Santa Clara Valley Water District.
City of San Jose Alviso Master Plan (1998)	■ River Orientation Policies 1-3: These policies are intended to ensure that new development adjacent to the Guadalupe River/Alviso Slough enhances the river by providing views and direct access.

Table 3-19. Continued

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Document	Policies and Programs
City of San Jose Rincon de los Esteros Redevelopment Plan, Twenty-Third Amended (City of San Jose 1999)	■ Section 201 (I). Public Parks and Open Space. This land use category includes general plan designated "Trails and Pathways corridors" and applies to Santa Clara Valley Water District creeks as follows: ☐ Along the Hetch Hetchy Aqueduct right-of-way (80 feet wide), which is planned by the County as an east-west pedestrian/bicycle connection between Guadalupe River and Coyote Creek. ☐ Along the Guadalupe River and Coyote Creek, both of which are planned by the Santa Clara Valley Water District to be left in their natural states and utilized as pedestrian/bicycle pathways.
Countywide Trails Master Plan (Santa Clara County 1995)	■ Plan for Trails, Policy PR-TS 1.4: The countywide trail system should be linked to provide for regional trails including the Bay Area Ridge Trail, the Benito-Clara Trail; and the San Francisco Bay Trail systems encircling the urban areas of the County and the San Francisco Bay.
Santa Clara Valley Water District Governance Policies of the Board of Directors, December 1, 2000 (Santa Clara Valley Water District 2000)	■ Policy Number E-1, adopted on November 21, 2000: 1. There is a healthy and safe environment for residents and visitors. 1.1. There is a reliable supply of healthy, clean drinking water. 1.2. There is reduced potential for flood damages. 1.2.1. The cost of reducing the potential for flood damages is balanced with benefits (including possible environmental restoration and enhancement). 1.2.2. There is a balance between the contributions of watersheds and streams in providing for public health and safety and in providing protection of natural resource benefits. 1.2.2.1. Homes, schools, businesses, and transportation networks are protected from flooding and erosion. 1.2.2.2. There is clean, safe water in our creeks and bays. 1.2.2.3. Groundwater supplies are sustained. 2. There is an enhanced quality of life in Santa Clara County 2.1. Watersheds, streams, and the natural resources therein are protected and when appropriate enhanced or restored. 2.1.1. Healthy creek and bay ecosystems are protected, enhanced, or restored as determined appropriate by the Board. 2.1.1.1. Opportunities to enhance or restore natural resource benefits of streams and watersheds are identified. 2.1.1.2. Mitigation, enhancements, or restorations are implemented when determined appropriate by the Board. 2.2. There are additional open spaces, trails, and parks along creeks and in the watersheds when reasonable and appropriate.
City of San Jose, Riparian Corridor Policy Study, May 1994 (City of San Jose 1994b)	■ Guideline 1C: Setback Areas Flood Control Maintenance Roads Maintenance roads required by the SCVWD for maintenance of flood control facilities should be located outside the riparian corridor but need not be set back from it.

Table 3-19. Continued

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Document	Policies and Programs
	▪ Guideline 2C: The adverse visual impact of existing or unavoidable incompatible uses such as parking areas, loading zones, trash enclosures, mechanical devices, and similar accessory uses should be minimized by landscaping, hedging, berming, low walls, and site design.
	▪ Guideline 4A: Recreation Facilities Multi-use trails should be located 10 feet from the riparian edge if feasible, but in no case should this guideline be used to preclude the development of continuous trails access along riparian corridors.
	▪ Guideline 4C: Trails Trail Design and Layout Trails should be carefully aligned to minimize negative impacts to the corridor while providing a rewarding experience for the user. 1. Trail systems should be designed so that: a. Main (high use) trails are up out of the channel and set back from the edge of the top of bank. b. Minor or lateral (lower use) trails only parallel the edge of the creek (i.e. at the toe of the bank) for a short distance. 2. Trails should be carefully sited to avoid sensitive riparian habitat areas and areas which support significant wildlife uses. 3. Trails should be constructed according to standards which are sensitive to the type of riparian resources they are bisecting (e.g., elevated catwalks across wetland areas, narrower trail tread on steep side slopes). 4. Trails should be routed directly through areas of disturbed habitat and non-native vegetation. At the same time undertake a program to restore the surrounding areas to the native habitat (e.g., construct trail tread through undesirable invasive non-native [exotic] plant species, such as giant reed). 5. Specially designed trails and viewpoints should provide controlled opportunities for people to view, enjoy, experience and learn about stream and riparian systems.

- strengthen and expand the community's tax base through an effective program for economic development and improved employment opportunities;
- provide for the installation of capital improvements to support the program and attract private investment;
- remove substandard structures and buildings; encourage labor-intensive industries; and
- encourage new development to include transportation demand programs.

The redevelopment plan states that land designated as public parks and open space (which includes the lower Guadalupe River) should be available for public use. (City of San Jose 1999.)

City of San Jose Airport Master Plan Update

The airport master plan comprises a phased program of facility improvements designed to fully accommodate projected commercial aviation demand by 2010. The Airport Master Plan EIR was completed in 1997. Two master plan improvements are located within the LGRP area: 1) the new fuel storage facility to be located on the city-owned vacant parcel on the west side of the river in reach B, and 2) the conversation of a surface-parking lot to a multistory facility for rental cars on the east side of the river in reach A (Greene pers. comm., City of San Jose 1997).

City of San Jose Bicycle Master Plan

The bicycle master plan identifies a citywide transportation bicycle network. The Guadalupe River system is not included in this plan. The plan covers a 5-year period and is currently outdated. An updated plan will be created when funding becomes available (Collins pers. comm., City of San Jose 1993).

City of San Jose Riparian Corridor Policy Study

The riparian corridor policy study promotes the preservation of riparian corridor areas along natural streams. The study includes policies and goals of activities that might occur within or adjacent to these areas and remain consistent with the general plan. The Guadalupe River is identified as a riparian corridor within the San Jose Urban Services Area and Urban Reserves.

City of San Jose Guadalupe River Park Master Plan

The Guadalupe River Park is located south of I-880 and is adjacent to the LGRP area. The master plan was designed to be consistent with the goals of both the city and county general plans regarding the provision of public access, the creation of water features, and the development of open space (Duenas per. comm., City of San Jose 1989).

City of Santa Clara General Plan 1990–2005

The general plan is intended to guide the city's development through 2005 and beyond. One of the relevant land use goals of the general plan is a commitment to cooperate with other jurisdictions in seeking solutions to regional problems while maintaining control over local land use. The general plan also includes policies for parks, recreation, and trails. These policies are provided to preserve recreation and open-space areas within the city, promoting the enhancement of trails and open space throughout the community within an urban environment. (City of Santa Clara 1992.)

Santa Clara County Countywide Trails Master Plan (1995)

The purpose of this plan is to provide direction for future trail corridors and connections within Santa Clara County. The lower Guadalupe River corridor is designated as a subregional trail route (S3–Guadalupe Trail) in this plan (Santa Clara County 1994). The levee trails are proposed to connect to the San Francisco Bay Trail, which would open access from the urban areas of Santa Clara County to the recreational opportunities of the bay. These trails are proposed for hiking and off-road bicycling (Santa Clara County 1995).

Santa Clara County 1997 Alviso Marina County Park Master Plan

The 29-acre park site, which is situated at the mouth of the lower Guadalupe River, consists of 2 parcels: one 15-acre parcel that includes the parking lot and former marina, and one 14-acre parcel to the north, that consists entirely of salt ponds and levees. Master plan goals include providing facilities for regional recreation that take advantage of site characteristics and resources, and protecting and enhancing the park's natural character and scenic quality. The master plan includes redeveloping the county park. Phase 1, which included surfacing the parking lot and adding restrooms, is complete. Phase 2 includes building a new boat launch and floats at the mouth of Alviso Slough, pending land acquisition from USFWS. Phase 3 includes reconfiguring the existing parking lot to provide the same amount of parking, as well as sheltered picnic areas and irrigated landscaping, removing existing marina floats, adding an interpretive boardwalk across the marsh in the marina basin, adding an observation deck north of the parking area off the levee near the UPRR tracks, and developing interpretive trails with various amenities and signs. The proposed boat-launch ramp is on federal property, which the county is planning on exchanging for the salt pond parcel. (Santa Clara County 1997, Vo pers. comm.)

Santa Clara VTP 2020 Plan

The VTA is currently completing the VTP 2020 Plan, which will set local transportation priorities for the next 20 years. Minor highway improvements are planned along some portions of SR 237, but not near the Guadalupe River (Ristow pers. comm.).

The San Francisco Bay Trail Plan

The Bay Trail is a 400-mile-long trail proposed around the perimeter of San Francisco and San Pablo Bays. It is intended to offer walkers, runners, cyclists, and hikers access to the bay and its diverse resources. Segments of the Bay Trail already exist in several jurisdictions. The Bay Trail will provide connections to existing recreation facilities and create links to transportation facilities to avoid adverse effects on environmentally sensitive areas. The Bay Trail is proposed to connect to the Guadalupe River at Gold Street, where the Guadalupe east levee will serve as a connector trail for the system. (City of Santa Clara 1992.) The City also has a Bay Trail Master Plan.

Methods and Significance Criteria

The following evaluation of impacts on land use and planning is based on information gathered from site visits and review of relevant environmental documents.

Criteria for determining the significance of impacts on land use and planning were based on appendix G of the CEQA Guidelines, the NEPA Regulations, and professional judgment. The LGRP may have a significant impact on the environment if it would

- physically divide an established community;
- conflict with any applicable federal, state, local, or tribal land use plan or relevant policies, including the San Jose and Santa Clara general plans; or

- conflict with any applicable habitat conservation plan or natural community plan.

The impact analysis below assumes a 17,000 cfs floodflow. Potential impacts associated with the additional 1,350 cfs of interior drainage entering the Guadalupe River are addressed in chapter 4, "Cumulative Impacts."

Alternative 1: No Project

Impact: Potential for Conflicts with Existing and Proposed Land Uses and Policies

Under the No-Project Alternative, the Proposed Project would not be built and no provisions would be made to convey the design floodflows in the lower Guadalupe River channel. No direct impacts on existing or planned land uses would result from maintenance activities under this alternative. However, under this alternative, the potential exists for the design floodflows to overtop existing levees and potentially affect businesses and residences adjacent to the river. The lower Guadalupe River would contain approximately 396 cms (14,000 cfs) and approximately 170 cms (6,000 cfs) would flow overland along North First Street in Alviso. Overland flows would cause floodwaters to reach a depth of 2.2 m (7.2 feet) in Alviso. This impact is addressed in detail in the "Hydrologic and Hydraulic Conditions" section of this chapter. Please refer to that section for evaluation of flooding impacts.

Current maintenance activities allowed under the No-Project Alternative are consistent with local plans and policies, because there would be no direct effect from these activities on adjacent land uses. However, this alternative is generally inconsistent with District and City policies to provide adequate flood protection for adjacent land uses, and with City policies to provide increased recreation and public access to the river corridor.

Alternative 2: Floodwalls/Levee Raise (Proposed Project)

Impact: Potential for Conflicts with Existing and Proposed Land Uses

Implementation of the Proposed Project would not add to or modify structures or alter the environment in a way that would cause an established community to be divided. The LGRP is not under the jurisdiction of a habitat conservation plan or community conservation plan, and does not significantly conflict with any applicable federal, state, or tribal land use plan or relevant policies.

Under the Proposed Project, construction of flood-control facilities would directly affect only the structures within the District ROW. Currently, the land uses adjacent to the LGRP area include industrial, commercial, residential, parks and recreation, and open space. Because all construction activities would be within the ROW, there would be no direct impacts on existing land uses from construction of floodwalls and levees. This impact is considered less than significant.

Construction activities under the Proposed Project could have indirect nuisance-related impacts on adjacent land uses in reaches A–G. Operation of construction equipment, levee excavation, pile driving, and other construction activities could create combined construction nuisances from dust generation, construction noise, and traffic delays (please refer also to the "Transportation and Traffic," "Air Quality," and "Noise" sections of this chapter). Indirect nuisance effects on adjacent land uses are considered less than significant because construction nuisances would be temporary, most of the construction under the Proposed Project would be on existing levee structures, and construction equipment would operate a substantial distance from most sensitive land uses. No mitigation is required.

Impact: Consistency with Local Plans and Policies

The Proposed Project would be consistent with local land use policies, because flood-control features would be contained within the District's ROW and would not directly conflict with any planned development. The general plans of the Cities of San Jose and Santa Clara also address the opportunities for public use of waterways and natural areas, specifically on the Guadalupe River. The policies encourage the use of trails for recreation purposes including walking, running, biking, and observing nature. In support of these policies, the Proposed Project would provide widened maintenance roads on the levees that may be used for recreation and public access. The raising of the SR 237 bridge would have a beneficial impact on local plans for trails and public access. The potential for the Proposed Project to be inconsistent with local plans or policies is considered less than significant. No mitigation is required.

The Proposed Project is considered consistent with the City's Bay Trail Master Plan.

Impact: Potential for Construction-Related Nuisances from Raising the SR 237 Bridge

Under the Proposed Project, construction required to raise the eastbound SR 237 bridge could create construction nuisances for adjacent residential and industrial land uses from increased noise, dust, and equipment operation (Please refer also to the "Transportation and Traffic," "Noise," and "Air Quality" sections of this chapter.) This impact is considered less than significant because the bridge construction effects would be temporary, few sensitive land uses are located near the bridge, and the District would implement measures, in coordination with Caltrans, to minimize construction-related impacts (please refer to chapter 2 under "Environmental Commitments"). No mitigation is required.

The following environmental commitments to minimize construction-related impacts have been built into the project design. For complete details of these commitments, refer to chapter 2, "Proposed Project and Alternatives." With implementation of these environmental commitments, no further mitigation would be required.

- **Measures to implement BAAQMD's Feasible Control Measures for PM10 Emissions from Soil Removal Activities.** These measures are contained in BAAQMD's *Feasible Control Measures for PM10 Emissions from Soil Removal Activities* (Bay Area Air Quality Management District 1996a).
  - Water all active construction sites at least twice daily.
  - Cover all trucks hauling soil, sand, and other loose materials, or require all trucks to maintain at least 2 feet of freeboard.
  - Pave, apply water 3 times daily, or apply (nontoxic) soil stabilizers on all unpaved access roads, parking areas, and staging areas at construction sites.
  - Sweep daily (with water sweepers) all paved access roads, parking areas, and staging areas at construction sites.
  - Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets.
- **Measures to Address Traffic-Related Effects**
  - Before construction begins, signs with the construction periods clearly displayed will be posted warning commuters of potential construction delays.

  - ☐ During construction, signs will be posted at access points to major roadways to notify drivers of alternative routes.

- **Noise-Reducing Construction Practices**
  - ☐ All equipment will have sound-control devices no less effective than those provided on the original equipment, and all equipment will be operated and maintained to minimize noise generation.
  - ☐ No equipment will have an unmuffled exhaust.
  - ☐ The District will designate a "noise abatement coordinator" who will be responsible for responding to any local complaints about construction noise. The telephone number of the noise abatement coordinator will be posted at the construction site and included in notices that will provide the construction schedule and be sent to residents within 300 m (1,000 feet) of the LGRP. The noise abatement coordinator will determine the cause of noise complaints (e.g., starting too early, bad muffler) and will require that reasonable measures to correct the problem be implemented. The District will be responsible for posting and providing notices of construction schedules to residents, and will give the noise abatement coordinator's name and telephone number to the directors of the City's Department of Planning, Building and Code Enforcement; the City of Santa Clara Planning and Inspection Department; and the Santa Clara County Planning Office.

Impact: Potential for Land Use Conflicts from Construction of SR 237 Bypass Culvert Option

Under the Proposed Project, construction of the SR 237 bypass culvert (instead of raising SR 237) would encroach on property outside the District's ROW. The site is currently open space with a pond located approximately 50 m (164 feet) from the current levee and 100 m (328 feet) from SR 237. Use of this property for a bypass culvert would encroach on an existing mobile home park on the southeast side of SR 237.

The construction of a retaining wall in reach F would substantially decrease the distance between the levee and the existing mobile home park located adjacent to the lower Guadalupe River and SR 237. Currently, the levee is approximately 50 m (164 feet) from the existing mobile home park. The retaining wall would need to be constructed immediately adjacent to the northwestern side of the mobile home park. Depending on the specific design and height of the new retaining wall, the potential exists for safety concerns associated with the proximity of residential development near flood-control structures. During a design flood event or when the bypass culverts are operating, residents could access the top of the proposed retaining wall and fall. This potential safety risk is considered a significant impact. To reduce this impact to a less-than-significant level, the District would implement the following measure if the bypass option is selected.

Mitigation Measure LU-1: Install Safety Measures

To ensure the safety of the residents of the mobile home park located adjacent to the proposed levee extension in reach F, a safety rail or fence will be added to the top of the retaining wall in the vicinity of the mobile home park, and access to the retaining wall on the south levee will be restricted to ensure that residents or other recreation users of the levees cannot access this area during flood events.

Alternative 3: Channel Bank Modification

Impact: Potential for Conflicts with Existing and Proposed Land Uses

Implementation of the Channel Bank Modification Alternative would have land use conflicts similar to those described for the Proposed Project. This alternative would not add to or modify structures or alter the environment in a way that would cause an established community to be divided. The LGRP is also not under the jurisdiction of a habitat conservation plan or community conservation plan, and does not significantly conflict with any applicable federal, state, or tribal land use plan or relevant policies.

Under the Channel Bank Modification Alternative, construction of flood-control facilities would directly affect only the structures within the District ROW. Currently, the land uses adjacent to the LGRP area comprise industrial, commercial, residential, parks and recreation, and open space. Because all construction activities would be within the District's existing ROW, there would be no direct impacts on existing land uses adjacent to construction channel modification structures or bridge approach floodwalls. This impact is considered less than significant.

Construction activities under the Channel Bank Modification Alternative could have indirect nuisance-related impacts on adjacent land uses that are similar to those of the Proposed Project because this alternative would require operation of construction equipment, levee excavation, pile driving, and other construction activities in the same reaches as the Proposed Project.

Construction nuisances from dust generation, construction noise, and traffic delays (please refer also to the "Transportation and Traffic," "Air Quality," and "Noise" sections of this chapter) would generally be similar to those described for the Proposed Project, except that channel bank modification structures would require more construction activity than would be expected for floodwall or levee raising under the Proposed Project. Indirect nuisance effects on adjacent land uses are considered less than significant because construction nuisances would be temporary, most of the construction under this alternative would be on the inboard toe of existing levee structures, and construction equipment would operate a substantial distance from most sensitive land uses. In addition, implementation of environmental commitments that are built into the project design would further minimize impacts.

Impact: Consistency with Local Plans and Policies

The Channel Bank Modification Alternative would be consistent with local land use policies because flood-control features would be contained within the District's ROW and would not directly conflict with any planned development. The Santa Clara general plans of the Cities of San Jose and Santa Clara also address the opportunities for public use of waterways and natural areas, specifically on the Guadalupe River. The policies encourage the use of trails for recreation purposes including walking, running, biking, and observing nature. The Channel Bank Modification Alternative would support these policies in a manner similar to that discussed for the Proposed Project. The potential for this alternative to be inconsistent with local plans or policies is considered less than significant. No mitigation is required.

Alternative 4: Channel Bypass

Under the Channel Bypass Alternative, the potential for conflicts with existing and proposed land uses could be greater than conflicts identified for the Proposed Project. Constructing the bypass culverts in lower Guadalupe River levees would require extensive excavation of levee structures over a longer construction period than under the Proposed Project. This more complicated, extensive construction activity would create a longer period of construction nuisances than under the Proposed Project. The Channel Bypass Alternative would also potentially require acquisition of new ROW for construction of bypass culverts at bridge crossings (i.e., Trimble Road). Construction in areas outside existing District ROW could result in direct conflicts with existing and planned land uses. Construction of bypass culverts at Trimble Road, Montague Expressway, Tasman Drive, and SR 237 could also result in traffic nuisances and delays from culvert construction at these locations. This alternative would also require relocation of the Hetch Hetchy pipelines, which would not be required under the Proposed Project.

Baylands Mitigation Measure

Impact: Potential for Conflict with Existing and Planned Land Uses

The proposed Baylands Mitigation Measure would involve construction of an overflow weir, articulated concrete mattresses along the levee separating ponds A5/A7 and A6, and a levee/floodwall and would require maintenance downstream of the UPRR. The main land uses in this area are the town of Alviso (residential, commercial, and industrial land uses), the yacht club, the Alviso Marina, the USFWS Don Edwards National Wildlife Refuge, and the Cargill Salt Ponds. Implementation of the Baylands Mitigation Measure would have relatively minor direct physical impacts on any of these land uses from construction of flood-control facilities. Any direct impacts on existing land uses are considered less than significant because construction of the proposed structures would not require a change in any current land use.

Construction of the proposed levee/floodwall could have temporary construction-related nuisance impacts in Alviso, but these potential effects are considered less than significant because most sensitive land uses would be located a considerable distance from the construction area.

Construction of a levee or floodwall adjacent to the Alviso Marina/County Park could create changes in the plans and operation of this facility. Currently, the parking lot that provides access to the site is at an equal elevation with the levee that surrounds the former marina basin. Picnic benches are available on the borders of the parking lot. Two additional picnic areas and benches are proposed on the edge of the main parking lot. The existing trails that are located on the levee tops would remain open with a boardwalk proposed approximately halfway around the former marina basin that connects to the parking lot (to form a complete loop to be used for recreation and nature observation). There is a boat launch ramp proposed on the west end of the park. Emergency access to the existing boat launch ramp is also proposed.

Raising the current levee or adding floodwalls in this area would affect the planned land uses for the Alviso Marina County Park. Depending on the determined additional height, raising the levees may significantly affect wildlife observation opportunities from picnic areas and benches. The boat launches and boardwalk would require design features to take into account the additional height of the levee to remain accessible from the proposed parking lot. Because of the extensive changes in design features associated with the change in levee elevation, the Baylands Mitigation Measure would create a significant impact on the planned Alviso Marina County Park. To reduce this impact to a less-than-significant level, the following mitigation measure would be implemented.

Mitigation Measure LU-2: Design Floodwalls or Levees to Accommodate Park Design

The District will design the floodwalls or levees to accommodate the park design and coordinate with the County to ensure that construction of flood-control facilities does not interfere with planned use of this facility.

The Alviso Slough levee would be constructed west and north of Alviso to protect the town from all Guadalupe River flows entering it from Alviso Slough. The levee would run from the UPRR bridge along the boundary of Alviso to the marina parking lot. The remaining portion of the new levee is within the jurisdiction of the Santa Clara County Marina Master Plan area and would be built by either Santa Clara County or the District. It is estimated that the levee would be raised by up to 0.5 m (1.5 feet). The Alviso Marina, currently in the planning stage by Santa Clara County Parks and Recreation, would be designed to an elevation that matches the proposed levee height plus freeboard.

Information on the design of the Baylands Mitigation Measure can be found in the "Hydrologic and Hydraulic Conditions" section of this chapter and in chapter 5 of the Engineer's Report.

Recreation, Public Access, and Visual Resources

This section discusses recreational use of and public access to the lower Guadalupe River and the visual resources that the river provides to the surrounding communities.

Existing Recreation and Public Access

The lower Guadalupe River offers surrounding residents an open-space corridor of riparian forest, perennial wetlands, and ruderal herbaceous habitats. Informal pathways run along the river on top of the levees from I-880 to the UPRR bridge. The river corridor is accessible to the public through gates that open onto major river crossings, but the levees are not official City trails (Yee and Duenas pers. comms.). In the LGRP area, the river accommodates some water-dependent recreation, such as limited boating and fishing; however, all activities are enhanced by the river, including walking, nature viewing, jogging, and bicycling.

Trails and Pathways

There are continuous, unpaved District maintenance roads on top of the levees on each side of the Guadalupe River (between bridge crossings) for the entire length of the river within the LGRP area. These maintenance roads are unofficial trails that, in most reaches of the project area, are used by the public for walking, running, hiking, and observing wildlife. The subregional trail route extends along the Guadalupe River levees from Alviso to south of the Guadalupe Reservoir in southernmost San Jose.

The San Francisco Bay Trail is a planned 400-mile-long trail that extends along the perimeter of San Francisco and San Pablo Bays. The Association of Bay Area Governments (ABAG) has designated the lower Guadalupe River levee trail as a connector trail to the Bay Trail. The intent of building the San Francisco Bay Trail is to increase access to the bay and encourage recreation opportunities for walkers, runners, bikers, and nature lovers. The LGRP area is part of the San Jose General Plan 2020 Scenic Route and Trails Program and is planned for future Class 1 trail development on the east levee.

Reach A

The District maintenance roads extend on top of both the east and west levees of reach A.

Reach B

The City of Santa Clara has installed public-access gates that allow entrance to the unofficial pathways where the Guadalupe River extends beneath Trimble Road (Yee pers. comm.). Adjacent land uses, including industrial facilities and vacant lots, do not support a large number of recreationists in this reach. The pathways may not be directly accessed from U.S. 101, the southern boundary of reach B (Yee pers. comm.).

Reach C

The City of Santa Clara has installed public-access gates at the south end of reach C at Trimble Road, and at the north end at Montague Expressway (Yee pers. comm.). On the west bank of the river, there are a few gates that lead from residential back yards to the levee tops. There is unofficial access from houses on the west bank of the river and from the businesses on the east bank. Dirt trails lead to the tops of levees from the backs of houses and businesses, and residents use the levee roads for walking and running.

Reach D

Reach D includes a gated connection to the levees from the Mansion Grove Apartments, off Lick Mill Boulevard between Montague Expressway and the Hetch Hetchy Aqueduct on the west side of the river (Yee pers. comm.). The levee roads in this area are used extensively for walking, running, and biking. The Mansion Grove Apartments on the west bank have a break in the fence that allows residents to access the levees by way of a dirt path. The Ulistac Natural Area has a paved path that connects from the natural area to the top of the levee right before the downstream end of reach D on the west bank of the levee.

Reach E

The City of Santa Clara has installed a public-access gate that allows entrance to the unofficial pathways where the Guadalupe River extends beneath Tasman Drive (Yee pers. comm.). The levee roads in this area are used extensively for walking, running, and biking. In addition, the Ulistac Natural Area has been completed on the west bank; it includes 2 paved paths that lead to the top of the levees.

Reach F

There is access to this reach at its southern boundary at Tasman Drive, but no access at SR 237 (on the west bank), the northern boundary, which limits recreational opportunities. There has been little recreational use in this reach. On the east bank, there are 3 informal trails from the mobile home park near SR 237 to the tops of the levees. One trail is immediately north of the pond; the others begin at the basketball court. There are mobile homes on the west side of the levee. Residents access the levee by going around the gate at the Gold Street crossing, and use this stretch for jogging and walking. They walk up to SR 237 on the west-bank levee where the path loops around a wetland area and then continues back to Gold Street.

Reach G

There has been little recreational use of the levee roads in this reach. The levee roads cannot be directly accessed from SR 237, which limits recreational access (Yee pers. comm.).

Boating and Fishing

Although there are no boat-launch ramps, there is some recreational boating on the Guadalupe River. During moderate to high flows, the river is navigable by small watercraft, including canoes and kayaks, from the dam above Blossom Hill Road to the mouth at Alviso (Western Water Canoe Club 1997). Boating opportunities are limited during low-flow conditions from May to November (City of San Jose 1996). The Cities of San Jose and Santa Clara generally discourage fishing in the lower Guadalupe River because the fish may contain trace amounts of heavy metals (Helmke and Duenas pers. comms.). Signs are posted along the banks of the river south of I-880 warning the public not to eat fish caught in the river.

Adjacent Recreation

Adjacent to the lower Guadalupe River, recreational activities available to the public include a course that offers a variety of fitness stations, such as pullup bars and situp tables. There are also pathways, a golf course, and a BMX course.

Reaches A–C

There is currently no adjacent recreation in reaches A–C.

Reach D

Within the Mansion Grove Apartments, a residential complex located between Montague Expressway and the Hetch Hetchy Aqueduct, there is a gated connection to the west-bank levee of the lower Guadalupe River where the levee-top pathway may be accessed. The tennis courts, a basketball court, and batting cages within this residential complex are adjacent to this river access. High-density residential developments along both sides of the lower Guadalupe River contain various recreational opportunities for the residents, including tennis courts, swimming pools, and basketball courts. These recreational opportunities are available only to residents of the developments.

South of Montague Expressway, a par course winds around the business campuses on the east side of the river. The par course is open to the public.

Reach E

The Ulistac Natural Area is immediately south of Tasman Drive on the west side of the lower Guadalupe River. Developed by the City of Santa Clara Parks and Recreation Department and the Santa Clara County Open Space and Sports Authority, this 40-acre natural area has public trails for walking, running, and biking, and 2 ramps that connect to the pathways on the river's west levee (Yee pers. comm.).

Reach F

South of SR 237 is the former City of Santa Clara landfill, which was closed in September 1993. A portion of this land has been developed into a public BMX bike trail operated by the Santa Clara Police Athletic League.

The Santa Clara Golf and Tennis Club is located south of SR 237 and the former landfill on the west side of the river. This public facility offers open play and lessons in golf and tennis and has banquet facilities.

Reach G

The Pinhigh Golf Center is located on North First Street on the east side of the lower Guadalupe River north of SR 237. This facility offers a driving range, putting green, chipping and sand greens, and a 3-hole golf course open to the public.

Planned Recreation and Public Access

In the distant future, the City of Santa Clara plans to build several bike bridges on the west side of the Guadalupe River to connect to San Jose on the river's east side. These bridges will provide access to recreation opportunities from both sides of the river.

Although there is no official plan, the City would like to create class 1, paved bike trails along the levee tops. If such trails are approved and built, the levees will be better connected to local office complexes, opening up public use of the current pathways. (Yee pers. comm.)

Although not part of the LGRP, the option will be provided to accommodate future recreation trails on the tops of levees and under bridges.

Reaches A–C

There is currently no planned recreation in reaches A–C.

Reach D

An initial study is under way to assess the impacts of adding a bridge/bicycle crossing to the back of the SCCTD office complex just north of Montague Expressway from the Mansion Grove Apartment Complex (Yee pers. comm.).

Reaches E and F

There is no planned recreation in reach E or F.

Reach G

The San Francisco Bay Trail is proposed to connect with the east levee of the lower Guadalupe River, providing extensive opportunities for public access from residences and offices. The levee trail would act as a connector trail from the main spine of the Bay Trail, which runs around the perimeter of San Francisco and San Pablo Bays, to other trails and natural areas in the south bay. The Bay Trail is proposed to meet the current east-bank levee pathway from Gold Street in Alviso. (McBride pers. comm.). A Pre-Final Bay Trail Master Plan was made available in June 2001.

From west of the lower Guadalupe River, a proposed trail would run from the Sunnyvale Baylands Park, connect to an existing Bay Trail path that runs along SR 237, and intersect with a proposed Bay Trail path that would connect with the east levee of Guadalupe River at Gold Street. From east of the lower Guadalupe River, a trail is proposed to span from Coyote Creek to the river that would follow existing roads, including Zanker Road and Los Esteros Road, and connect to the east bank of the lower Guadalupe River at Gold Street.

Directly north of reach G, the Alviso Marina County Park is planned by the Santa Clara County Department of Parks and Recreation. Master plan goals include providing facilities for regional recreation that take advantage of site characteristics and resources, and protecting and enhancing the park's natural character and scenic quality. Proposed recreation opportunities include

- building a new boat launch and floats at the mouth of Alviso, an interpretive boardwalk across the marsh in the marina basin, and an observation deck north of the parking area off the levee near the UPRR tracks;
- developing interpretive trails with various amenities and signs; and
- providing areas for picnicking and observing wildlife. (Santa Clara County 1997, Vo pers. comm.)

Visual Resources

The riparian vegetation within the lower Guadalupe River channel provides a natural environment and a visual amenity within an urban environment. The riparian vegetation extends from reaches A through D, north of I-880 to just south of the Hetch Hetchy Aqueduct. Reaches E–G north of the Hetch Hetchy Aqueduct through Alviso are surrounded by perennial wetland and ruderal herbaceous habitat, allowing the river to be completely visible from the levee roads. In this area, a variety of birds, including harriers and kites, may be observed from the levee roads.

Views of the lower Guadalupe River are from adjacent land uses in reaches A–G and bridge crossings. Primary views from adjacent areas are of levee sides and the tops of occasional riparian trees (reaches A–D). Views from bridge crossings are of a vegetated creek environment with adjacent levees. The highest quality views of the lower Guadalupe River are related to informal recreational use of levee roads. In reaches A–D, these views are primarily of channel vegetation and riparian habitat with interspersed views of the creek channel. In reaches E–G, views are of tidal marsh habitats dominated primarily by cattails.

Methods and Significance Criteria

The following evaluation of impacts on recreation, public access, and visual resources is based on information gathered from site visits and review of relevant environmental documents.

Criteria for determining the significance of impacts on recreation, public access, and visual resources were developed based on appendix G of the State CEQA Guidelines and on professional judgment. A project could result in a significant impact if it would result in

- increased use of existing neighborhood and regional parks or other recreational facilities that could increase the probability of substantial physical deterioration,
- construction or expansion of recreational facilities that may have an adverse impact on the environment,
- a substantial adverse effect on a scenic vista,
- substantial degradation of scenic resources along a scenic highway,
- substantial degradation of the existing visual character or quality of the site and surroundings, or
- new sources of substantial light or glare.

Alternative 1: No Project

Under the No-Project Alternative, current channel maintenance activities would continue and existing conditions would remain generally unchanged. No new impacts on recreation, public access, or visual resources would result from the continuation of District practices.

Alternative 2: Floodwalls/Levee Raise (Proposed Project)

Impact: Potential Changes in Recreation Opportunities and Access

Under the Proposed Project, there would be no substantial changes in formal recreation opportunities in the LGRP area because there is no formal recreation in the lower Guadalupe River corridor. Levee maintenance roads are used for informal recreational purposes, although they are not formally designated as recreational trails by the District. Santa Clara County has identified the lower Guadalupe River as a potential subregional trail route. In the future, the District may construct recreation facilities and a trail on top of levee maintenance roads. This is considered a beneficial impact. Impacts on wildlife that may be caused by the increase in recreational use are addressed in the "Wildlife" section of this chapter.

Construction of floodwalls or levees under this alternative would also require that backwalls on the outboard toe of the levees be constructed in several areas throughout reaches B–G. Construction of these backwalls may affect current informal access to levee roads by pedestrians and recreationists in reaches C–G. Proposed structures in the west-levee footprint could also affect a public-access connection between the paved access trails in the Ulistac Natural Area in reaches D and E and the west-levee road. This impact is considered less than significant because current use of LGRP levee roads is informal and the District would create formal connections to these and other planned regional recreation trails. No mitigation measures are required.

Currently, there is no access to the maintenance pathways from SR 237, and no pathways run under the road. The proposed raise of the eastbound bridge at SR 237 in reaches F and G would allow maintenance roads to continue along the banks of the levees, potentially providing the opportunity for a continuous trail from the Guadalupe River to the bay. This would be a beneficial impact for recreationists. The alternative proposed culvert would not be provide this additional benefit and would therefore have no impact different from existing conditions.

Impact: Conflicts with Existing and Planned Recreation Facilities

Implementation of the Proposed Project would not result in the increased use of existing neighborhood and regional parks or other recreational facilities that could increase the probability of substantial physical deterioration. It also would not result in the construction or expansion of recreational facilities that may have an adverse impact on the environment. The Proposed Project would not result in direct impacts on planned recreational facilities because specific development plans for recreation facilities are not ~~none are~~ proposed in the LGRP area, ~~and~~ construction would not affect adjacent recreational facilities, and a future regional trail system on LGRP levees would be accommodated.

An initial study is being prepared to assess the impacts of adding a bicycle bridge from the Mansion Grove Apartments to the SCCTD business complex in reach D. The proposed floodwalls or levee raising could affect the design of the bicycle ramp over the river, but would not significantly affect the planned project. These potential impacts are considered less than signficant. No mitigation is required.

Impact: Potential for Disruption of Recreational Use from Construction and Channel Management Activities

During construction of the Proposed Project, and during initial and periodic sediment and vegetation management activities, disruptions of current informal recreational use of levee roads and of views from these roads could result from increased noise, dust, equipment operation, and accessibility to levees. This impact is considered less than significant because construction activities would be temporary, current use is informal only, and the potential for future trail improvements would ultimately benefit recreationists. No mitigation is required.

Impact: Potential for Changes in Visual Resources and Views from Flood-Control Structures

The Proposed Project would add new structures to the project area, including up to 4 vortex rock weirs in the reach A low-flow channel. Proposed floodwalls would be constructed in reaches A, F, and G, and levee raising areas would be located in reaches B–F. Maintenance road undercrossings would be constructed at bridges, and new maintenance roads would be constructed on both banks of reach G. These structural changes would result in a slight change in visual resources in the river corridor but would generally be congruent with existing flood-control and bridge elements. This potential visual resources impact is considered less than significant because

- the extent and height of flood-control modifications has been minimized under the Proposed Project,
- the new structures would be located in areas of the river that are already developed, and
- the modifications would be constructed in areas that avoid substantial disruption of the vegetated portion of the channel and low-flow channel.

The changes to visual resources would also be consistent with existing flood-control elements on levees at bridges. No mitigation is required.

Levees would also be expanded and raised, and backwalls could be constructed in reaches B, D, E, F, and G. The levee improvements could result in a change in the slope of the levees on both the east and west banks. Views from adjacent land uses and the river corridor would be temporarily affected by the proposed activities because vegetation would be removed or covered for levee improvements. This impact is considered less than significant because changes in levee vegetation would be temporary and vegetation would be reestablished. No mitigation is required.

Impact: Potential for Changes in Visual Resources and Views from Channel Management Activities

Proposed vegetation and sediment management activities would also result in changes in visual resources and views to the channel bottom because periodic removal of sediment in reaches B–E and vegetation management in reaches A–G would reduce the amount of vegetation currently in the channel. Changes to visual resources would be most apparent at bridge approaches, where vegetation growth would be reduced substantially to ensure conveyance capacity and in sediment excavation areas in reaches B–E. Changes to visual resources would primarily result from loss or reduction of natural vegetative cover and would primarily affect views from levee roads, at bridge crossings, within the channel, and from the air.

This change to the visual resources of the lower Guadalupe River is considered a less-than-significant impact because visual changes would take place in established sediment and vegetation management areas and because riparian and wetland vegetation adjacent to the low-flow channel for all reaches would be preserved in buffer zones. Periodic vegetation and sediment management would also be conducted in alternating areas from the east to west bank, to intersperse maintenance areas with more vegetated areas in all reaches. No mitigation is required.

Alternative 3: Channel Bank Modification

Impact: Potential Changes in Recreation Opportunities and Access

Under the Channel Bank Modification Alternative, there would be no substantial changes in formal recreation opportunities in the LGRP area because there is no formal recreation use in the lower Guadalupe River corridor. This impact is similar to that described for the Proposed Project.

Levee maintenance roads are used for informal recreational purposes. Currently there are not continuous trails to the bay from the Guadalupe pathways, and this alternative would not modify these existing conditions. Under this alternative, levee maintenance roads would not be formally designated and used as pedestrian recreation trails.

Construction of channel modification structures and floodwalls under this alternative could also require that backwalls on the outboard toe of the levees be constructed in a number of areas throughout reaches B–G similar to the Proposed Project. Construction of these backwalls may have an effect on current informal access to levee roads by pedestrians and recreationists in reaches C–G in a manner similar to that of the Proposed Project. This impact is considered less than significant because current use of LGRP levee roads is informal and the District would accommodate future connections to these and other planned regional recreation trails. Mitigation measures that address public safety, including safety rails, are discussed in the "Land Use and Planning" section of this chapter. No additional mitigation measures are required.

Impact: Conflicts with Existing and Planned Recreation Facilities

Implementation of the Channel Bank Modification Alternative would not result in the increased use of existing neighborhood and regional parks or other recreational facilities that could increase the probability of substantial physical deterioration. It also would not result in the construction or expansion of recreational facilities that may have an adverse impact on the environment. This alternative would not result in direct impacts on planned recreational facilities (similar to the Proposed Project) because none are proposed in the LGRP area and construction would not affect adjacent recreational facilities. These potential impacts are considered less than significant. No mitigation is required.

Impact: Potential for Disruption of Recreational Use from Construction and Channel Management Activities

During construction of the Channel Bank Modification Alternative and initial and periodic sediment and vegetation management activities, disruptions of current informal recreational use of levee roads could result from increased noise, dust, equipment operation, and accessibility to levees. This impact is considered less than significant because construction activities would be temporary and current use is informal.

Maintenance activities, including sediment and vegetation management, would not result in conflicts with recreational use. This impact is considered less than significant because no formal recreation occurs in the channel bottom.

Impact: Potential for Changes in Visual Resources and Views from Flood-Control Structures

The Channel Bank Modification Alternative would require substantial modification to existing lower Guadalupe River levees, including excavating the inboard toe of the levee and constructing mechanically stabilized and concrete wall structures in reaches D–G. These structural changes would result in substantial changes in visual resources in the river corridor. Although judging changes in visual resources is an inherently subjective process and changes that may be offensive to one viewer are acceptable to another, the potential visual change in the river environment under this alternative is considered significant because of the magnitude of visual change. The view of the river channel would change from vegetated inboard levee sideslopes to vertical to near-vertical walls that are at least the height of existing levees and extend for approximately 4,800 m (15,748 feet). A hardened apron would also be required in reaches D–G. To reduce this impact to a less-than-significant level, the District would implement the following mitigation measure.

Mitigation Measure RV-1: Plant Vegetation After Construction

The District would construct MSE walls in a manner that would allow for vegetative plantings that would soften the look of the channel modification structures. Straight lines and engineered forms associated with MSE walls would have to be broken up to soften the impact. Some methods that may be used to accomplish this include

- planting native flowers, vines, and groundcovers adjacent to MSE walls or in wall openings to soften engineered lines;
- creating planting pockets or cluster plantings in MSE walls and aprons to contain native shrubs or trees; and
- using construction materials with colors and textures commonly found in natural river corridors.

Impact: Potential for Changes in Visual Resources and Views from Channel Management Activities

Proposed vegetation and sediment management activities under the Channel Bank Modification Alternative would be the same as those identified for the Proposed Project. Changes to visual resources and views of the channel bottom would result from periodic removal of sediment in reaches B–E and vegetation management in reaches A–G. Changes to visual resources would be most apparent at bridge approaches, where vegetation growth would be reduced substantially to ensure conveyance capacity and in sediment excavation areas in reaches B–E. Changes to visual resources would result primarily from the loss or reduction of natural vegetative cover and would be visible primarily from levee roads, at bridge crossings, within the channel, and from the air.

This change to the visual resources of the lower Guadalupe River is considered a less-than-significant impact because visual changes would take place in established sediment and vegetation management areas and because riparian and wetland vegetation adjacent to the low-flow channel for all reaches would be preserved in buffer zones. Periodic vegetation and sediment management would also be conducted in areas alternating from the east to west bank, to intersperse maintenance areas with more vegetated areas in all reaches. No mitigation is required.

Alternative 4: Channel Bypass

Under the Channel Bypass Alternative, the long-term potential for changes in recreation opportunities and access on the lower Guadalupe River would be similar to that described for the Proposed Project; no formal recreation is currently allowed in the channel or on levees, although levees are used informally for walking, running, and sightseeing. No substantial impacts on recreation access would result from this alternative once bypass culverts are built and levees are in place because it would be possible to provide access similar to what is currently provided. The potential for extending recreational trails on levee maintenance roads under a future project would also be possible. Conflicts with existing and planned recreation facilities, such as the Mansion Grove bicycle bridge, would be similar to those of the Proposed Project. Disruption of informal recreation pursuits on District levees would be greater than under the Proposed Project because the construction period for bypass culverts would be substantially longer.

Changes in visual resources during construction of the channel bypass would be greater than under the Proposed Project because of the extensive levee work that would be required. Once bypass culverts are in place, levee heights would be greater than under existing conditions, but levees would be located in generally in the same place. Changes in visual resources from vegetation and sediment management would be similar to those of the Proposed Project.

Baylands Mitigation Measure

Please refer to the "Land Use and Planning" section of this chapter for a discussion of potential impacts on the Alviso Marina/County Park. Implementation of the Baylands Mitigation Measure would have no other effects on recreation resources.

Impact: Potential for Changes in Visual Resources and Views from Flood-Control Structures

Construction of an inlet weir and small levee, articulated concrete mattresses along the levee separating ponds A5/A7 and A6, and the vegetation management area would create a minor impact on views to the mitigation area because of the small and relatively isolated areas of impact for the bayland mitigation measure structures. Changes in views would result primarily from construction of the inlet weir on Alviso Slough and from the vegetation management area and access roads. This area would be viewed from Alviso Slough and areas adjacent to Alviso Slough, such as the yacht club. However, this potential visual impact is considered less than significant because the proposed location of the inlet weir is not viewed frequently, past levee breaks have already disturbed the area, and vegetation management in this area would be in a relatively small isolated area in the slough environment. No mitigation is required.

The small levee between the UPRR and Alviso Marina would be located on an existing bermed area and is not expected to substantially change the visual resources in the area.

Transportation and Traffic

Investigation and Evaluation

The study area for the evaluation of transportation and traffic is the existing road network in the vicinity of reaches A–G, including roads that would be traveled by haul trucks during project construction. This section also provides information on existing traffic volumes on affected roads. Information for the LGRP's traffic analysis was obtained from the City Department of Public Works and Caltrans.

Operation of Roadways

The quality of service provided by a roadway is measured by its level of service (LOS). This method uses a letter rating to describe the peak-period driving conditions for a particular facility. The letters A–F represent progressively worse driving conditions. Generally, LOS A indicates free-flow operation with little or no delay, and LOS F denotes jammed flow with substantial delay (table 3-20). The City requires roadways to operate at LOS C.

Table 3-20. Summary of Level of Service Definitions

LOS Rating	Summary of Definition
A	Free flow; insignificant delays.
B	Stable operations; minimal delays.
C	Stable operations; acceptable delays.
D	Approaching unstable; queues develop rapidly, but no excessive delays.
E	Unstable flow; significant delays.
F	Forced flow; low operating speeds.

Source: Transportation Research Board 1994.

Existing Roads and Bridges

As shown in figure 2-1, the study area is regionally and locally served by several roadways. Individual roadways in the study area are described below by river reach. Additionally, table 3-21 summarizes roadway characteristics (e.g., average daily trips [ADT], etc.) for major freeways and arterial roadways in the study area.

Reach A is north of downtown San Jose between I-880 and U.S. 101, adjacent to the San Jose International Airport. Major surface streets in the LGRP area include Airport Boulevard, which runs north-south on the west side of the river, and North First Street, which runs north-south on the east side of the river and extends the entire length north to Alviso. Technology Drive runs from just north of I-880 on the east side of the river to just across Brokaw Road. Guadalupe Parkway (SR 87) runs north-south adjacent to the river on the east bank to U.S. 101, where it turns east and crosses North First Street. Most roadways in the vicinity of the LGRP operate at LOS D.

Table 3-21. Roadway Characteristics for Major Roadways in the Vicinity of the Lower Guadalupe River Project

Roadway	River Reach	Functional Classification	Average Daily Trips/ LOS[1]
I-880	A	6-lane freeway	157,000 (D)
SR 237	F, G	4-lane freeway	110,000 (D)
Brokaw Road	A	Arterial	46,000–56,000 (D)
De La Cruz Boulevard	B, C	Arterial	50,000 (D)
Guadalupe Parkway	A	Arterial	66,000 (D)
Montague Expressway	C, D	Arterial	49,800–61,600 (D)
North First Street	A, D, G	Arterial	31,300 (D)
Tasman Drive	D, E, F	Arterial	11,000–18,000 (D)
Trimble Road	B, C	Arterial	25,200–36,000 (D)

[1] Sources: Roadway information for I-880 and SR 237 was provided by California Department of Transportation 1999. All other information was provided by the City of San Jose 2000.

Reach B is bounded on the south by U.S. 101 and on the north by Trimble Road, both running east-west across the river. De La Cruz Boulevard runs north-south on the west side of the river. Roadway characteristics are provided in table 3-21. Most roadways in the vicinity of reach B currently operate at LOS D.

Reach C is bounded on the south by Trimble Road and on the north by Montague Expressway, both running east-west across the river. De La Cruz

Boulevard continues throughout this reach on the west side of the river; however, it is not adjacent to the riverbank, but lies west of the developed land along the west bank; Orchard Parkway runs north-south on the east side of the river. Roadway characteristics are provided in table 3-21. As shown in the table, most roadways operate at LOS D.

Reach D is bounded on the south by Montague Expressway and on the north by the Hetch Hetchy Aqueduct, both running east-west across the river. Lick Mill Boulevard runs north-south adjacent to the west bank of the river. A branch of Tasman Drive is on the east side of the river running south, then east and into North First Street. Roadway characteristics are provided in table 3-21. Most roadways in the vicinity of reach D operate at LOS D.

Reach E is bounded on the south by the Hetch Hetchy Aqueduct and on the north by Tasman Drive. Tasman Drive runs east-west across the river, but then turns south on the east side of the river, runs the length of the reach, then turns east and crosses North First Street. Lick Mill Boulevard continues throughout this reach on the west side of the river, where it ends at its connection to Tasman Drive. Roadway characteristics are provided in table 3-21. As shown in the table, most roadways operate at LOS D.

Reach F is bounded on the south by Tasman Drive and on the north by SR 237. At this point, SR 237 consists of 2 parallel bridges over the lower Guadalupe River, which separate east and westbound traffic. Part of Tasman Drive extends as a loop on the east side of the reach, and Lafayette Street runs north-south on the west side, adjacent to the UPRR tracks. Roadway characteristics are provided in table 3-21. Most roadways in the vicinity of reach F operate at LOS D.

Reach G is bounded on the south by SR 237 and on the north by the confluence of Lafayette Street and North First Street, which then turn into Gold Street just north of the reach. Roadway characteristics are provided in table 3-21. As shown in the table, most roadways operate at LOS D.

The levees on both sides of the river throughout the lower Guadalupe River reaches have dirt roads that are used for both maintenance equipment and informal pathways for recreationists.

Regulatory Framework

The appropriate city/county public works department maintains roadways that traverse city and county jurisdictions; state roadways are maintained by

Caltrans. In the vicinity of the project site, Caltrans has primary responsibility for I-880 and SR 237, and the City Department of Public Works has primary responsibility for the other roads in the study area (e.g., Guadalupe Parkway).

The use of state highways for other-than-normal transportation purposes might require written authorization from Caltrans. Requests for ingress into the roadway ROW require completing an application to encroach. Caltrans is responsible for overseeing statewide policy and procedure of encroachment permits for nonvehicular activities within the state highway system.

Methods and Significance Criteria

The following criteria were used to evaluate the significance of effects on transportation and traffic. These criteria are based on the CEQA Guidelines and professional judgment. The LGRP would result in a significant effect on transportation and traffic if

- street closures would result in a redistribution of traffic that would cause peak-hour traffic volumes to exceed available road capacity on any roadways,
- project-related traffic would cause an increase in traffic that is substantial in relation to the existing traffic load and capacity of the roadway system,
- project-related traffic would substantially increase the traffic delay experienced by drivers,
- project-related traffic would result in a substantial deterioration of the roadway surface, or
- project-related traffic would expose people to roadway safety hazards.

The traffic-related effects of the LGRP were evaluated based on a screening criterion recommended by the Institute of Transportation Engineers (1989) for assessing the effects of development projects that generate permanent traffic increases. This screening criterion indicates that in the absence of other locally preferred thresholds, a traffic access/impact study should be conducted when a proposed development would generate 100 or more additional peak-direction trips on or from the development site during the adjacent roadway's peak hours or the development's peak hours. This criterion is considered conservative for construction projects that generate temporary traffic increases. The criterion is intended to assess the effect of a traffic mix consisting primarily of automobiles and light trucks. Because construction of the LGRP would require a large number of heavy trucks, 1 trip by a heavy truck was assumed to equal 2 vehicle trips in this analysis.

The impact analysis below assumes a 17,000 cfs floodflow. Potential impacts associated with the additional 1,350 cfs of interior drainage entering the Guadalupe River are addressed in chapter 4, "Cumulative Impacts."

Alternative 1: No Project

Under Alternative 1, the No-Project Alternative, there would be no channel modification or construction of floodwalls; however, current vegetation management would continue throughout the reaches of the lower Guadalupe River. Routine maintenance of access roads and levees would also continue. There would be no interruption in existing transportation or traffic patterns as a result of the routine maintenance activities and continued vegetation management activities; however, the potential for flooding and closure of roadways would continue.

Alternative 2: Floodwalls/Levee Raise (Proposed Project)

Implementation of the Proposed Project would affect roadways by temporarily increasing the number of construction-related vehicles and heavy trucks on the surrounding roadways. Operations- or maintenance-related activities would require only occasional visits; therefore, operations-related traffic is considered minimal. Currently, District or District-authorized vehicles and trucks can access maintenance roads and construction sites by using the major roadway/bridge crossings (e.g., Montague Expressway, Tasman Drive).

Project trip generation is shown in table 3-22 and is based on an estimate of the number of heavy trucks and crew members that would be present during construction-related activities. As shown in the table, there would be 20 passenger-vehicle trips and as much as 15% (29 vehicle trips) of the total number of daily truck trips during the morning and evening peak traffic hours. In combination, the passenger-vehicle trips and the truck trips would generate approximately 49 trips during the morning and evening peak traffic hours.

Additionally, it is estimated that construction-related activities would include the use of several types of equipment such as backhoes, scrapers, water trucks, pickup trucks, and front loaders. It is assumed that a majority

Table 3-22. Average Daily Project-Related Trip Generation

Type of Vehicle	Number of Vehicles	Resultant Daily Trip Generation [1]	Resultant Peak Hour Trip Generation [2]
Passenger vehicles	20	40	20
Heavy trucks	95	190	29
Total	115	230	49

Notes:

[1] Vehicles and trucks accessing the site generate 2 daily trips (1 inbound and 1 outbound).

[2] Peak-hour trip generation is based on 50% of the resultant daily passenger-vehicle generation and 15% of the daily heavy-truck generation.

Source: Jones & Stokes 2000.

of the equipment would be stored on site and would not result in a substantial increase in the overall daily project trip generation.

Project construction activities would temporarily affect traffic on local roadways by adding vehicle traffic associated with commute trips by construction workers and trips by those using construction vehicles and delivering construction materials and by increasing congestion levels on local roadways traveled by project-related traffic during peak- and nonpeak-hour driving periods.

Implementation of the Proposed Project would also generate a minimal amount of operations-related traffic associated with vegetation and sediment management along with the routine maintenance of levees and access roadways. Because operations-related traffic is expected to be minimal and limited to a few pieces of maintenance equipment and a small number of workers, the resultant volumes of traffic are expected to be minimal; therefore, operations-related traffic effects are not discussed further.

The effects of the Proposed Project on roadway safety hazards would remain less than significant with implementation of a Traffic Safety Plan.

Impact: Short-Term Increase in Traffic Volumes Resulting from Construction-Related Activities

The Proposed Project would generate approximately 20 commute trips by construction employees during both the morning and evening peak commute hours. In addition, approximately 95 one-way trips per day by heavy trucks would be required to haul construction materials to and from the project sites.

The total number of vehicle trips (both trucks and other vehicles) to the project sites would generate approximately 49 trips during the morning and evening peak commute hours. The total is less than the significance threshold of 100 peak-hour trips per day (see table 3-22); therefore, implementation of the Proposed Project would have a less-than-significant adverse effect on roadway capacity because the number of construction-related trips would not substantially change the capacity of the roadways. No mitigation is required.

Impact: Deterioration of Roadway Surfaces

The Proposed Project would temporarily add an estimated 230 total daily vehicle and truck trips to local and regional roadways. As described above, construction-related traffic would not add a substantial amount of traffic on existing state or local roadways (which are maintained and would continue to be maintained under local jurisdictions). No additional maintenance requirements are anticipated for local or regional roadways. Alternative 2 would have a less-than-significant adverse effect on existing maintenance requirements for local roadways because the number of construction-related trips generated by the alternative would not substantially increase the number of vehicle trips on the roadway system. No mitigation is required.

Impact: Potential for Roadway Safety Hazards

Construction-site access points involving heavy trucks along the major roadway/bridge crossings would create roadway operation safety hazards. Slow-moving trucks hauling construction equipment and excavated materials in and out of the river channel would create visual impediments for motorists on roadways. Construction access points with potential safety concerns because of heavy traffic volumes and high speeds include several Guadalupe River bridge crossings (e.g., Montague Expressway, Tasman Drive). Large, slow-moving trucks entering or exiting roadways from these access points would create safety hazards for roadway motorists; however, this impact is considered to be less than significant because the project proponent would require the construction contractor to prepare and implement a traffic safety plan during the construction phase of the project. The traffic safety plan would include a comprehensive traffic/transportation control plan that would address

- appropriate vehicle size and speed,

- travel routes,
- detour or lane closure plans,
- flagperson requirements,
- location of turnouts to be constructed,
- coordination with law enforcement and fire control agencies,
- coordination with Caltrans personnel (for work affecting state road ROWs),
- emergency access to ensure public safety, and
- need for traffic and speed-limit signs.

The project proponent will also require the construction contractor to limit fill and material delivery to the construction sites to nonpeak traffic commute hours. Typically, peak commute periods are between 6 a.m. and 10 a.m. and 3 p.m. and 7 p.m., Monday through Friday. If this is not feasible, the project proponent will prepare traffic engineering studies to include peak-hour capacity calculations at affected roadways and intersections to demonstrate that acceptable levels of service will be maintained and roadway safety issues will be addressed. No mitigation is required.

Impact: Increased Delay for Traffic Traveling Across the SR 237 Bridge

Implementation of the Proposed Project involves raising the eastbound bridge section of SR 237 to match the westbound bridge's existing profile. During the construction period, the shifting of eastbound traffic to other designated sections of the bridge would result in reduced travel speeds and potential delays for vehicles traveling through individual work zones associated with bridge-replacement activities. Bridge-replacement activities would most likely necessitate reduced travel lane widths and periods of flagperson control along the bridge, resulting in varying periods of delay, particularly during peak driving periods. Although these construction-related disruptions are considered temporary, they are still considered significant because of the amount of existing traffic along SR 237 (110,000 ADT). No feasible mitigation (e.g., alternative detours) exists that would reduce this impact to a less-than-significant level; therefore, this impact is considered significant and unavoidable.

Alternative 3: Channel Bank Modification

Impact: Short-Term Increase in Traffic Volumes Resulting from Construction-Related Activities

The Channel Modification Alternative would generate approximately the same number of commute trips and heavy-truck trips for hauling materials to and from the construction site as the Proposed Project. Approximately 115 trips per day would be generated by construction activities and there could be up to 49 commute and truck trips during morning and evening peak commute hours. The total is below the significance threshold of 100 peak-hour trips per day (see table 3-22); therefore, implementation of the Channel Modification Alternative would have a less-than-significant adverse effect on roadway capacity because the number of construction-related trips would not substantially change the capacity of the roadways. No mitigation is required.

Impact: Deterioration of Roadway Surfaces

The Channel Modification Alternative would temporarily add an estimated 230 total daily vehicle and truck trips to local and regional roadways. As described above, project-related traffic would not add a substantial amount of traffic on existing state or local roadways (which are maintained and would continue to be maintained under local jurisdictions). No additional maintenance requirements are anticipated for local or regional roadways. The Channel Modification Alternative would have a less-than-significant adverse effect on existing maintenance requirements for local roadways for the same reasons as described for the Proposed Project. No mitigation is required.

Impact: Potential for Roadway Safety Hazards

Construction-site access points involving heavy trucks along the major roadway/bridge crossings would create roadway operation safety hazards. Slow-moving trucks hauling construction equipment and excavated materials in and out of the river channel would create visual impediments for motorists on roadways. Construction access points with potential safety concerns because of heavy traffic volumes and high speeds include several Guadalupe River bridge crossings (e.g., Montague Expressway, Tasman Drive). Large, slow-moving trucks entering or exiting roadways from these access points would create safety hazards for roadway motorists; however, this impact is considered to be less than significant because the project proponent would require the construction contractor to prepare and implement a traffic safety plan during the construction phase of the project. The traffic safety plan is described in detail under the Proposed Project.

Alternative 4: Channel Bypass

Under the Channel Bypass Alternative, short-term construction-related increases in traffic volumes, deterioration of roadways, and roadway safety hazards would potentially be greater than those described for the Proposed Project. The more complicated construction of bypass culverts under this alternative would require a greater number of construction trips involving heavy equipment and construction workers for a longer construction period than identified for the Proposed Project. Modification of the eastbound SR 237 bridge would also most likely be required under this alternative to accommodate bypass culverts in this area. Potential delays at SR 237 from this construction activity could be similar to those identified for the Proposed Project, depending on the amount of time that the eastbound SR 237 bridge would to be subject to construction activities.

Baylands Mitigation Measure

The baylands contain no surface roads other than those used for maintenance along the levees. The proposed construction activities in the baylands would have no effect on transportation and traffic.

Air Quality

This section describes the local topography and climate, applicable federal and state ambient air quality standards, existing air quality conditions, and applicable air quality management programs in the LGRP area, which is in the San Francisco Bay Area Air Basin (SFBAAB).

Topography and Meteorology

The project area is in the Santa Clara Valley, which is bounded by San Francisco Bay to the north and by mountains to the east, south, and west. The climate is warm on summer days and cool on summer nights; winters are fairly mild. At the northern end of the valley, mean maximum temperatures range from the high 50s in winter to the low 80s in summer, while mean minimum temperatures range from the low 40s in winter to the high 50s in summer. Temperature extremes are greater farther inland, where the moderating effect of San Francisco Bay is weaker.

Terrain greatly influences Santa Clara Valley winds, resulting in a prevailing flow that roughly parallels the valley's northwest-southeast axis. A north-northwesterly sea breeze typically flows through the valley during the afternoon and early evening, and a light south-southeasterly wind flows during the late evening and early morning. In summer, the southern end of the valley becomes a convergence zone when air flowing inland from Monterey Bay is channeled northward into the southern end of the valley and meets the prevailing north-northwesterly winds.

Wind speeds are highest in spring and summer and lowest in fall and winter. Mild winds are common in all 4 seasons, and summer afternoons and evenings tend to be breezy. Strong winds are rare and are associated mostly with winter storms.

Federal and State Ambient Air Quality Standards

The federal and state governments have established air quality standards for ambient concentrations of several key pollutants (table 3-23), including ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and particulate matter less than or equal to 10 or 2.5 microns in diameter (PM10 and PM2.5, respectively). For some pollutants, there are separate standards for different time periods. Most standards were set to protect public health; others were based on values such as protection of crops, protection of materials, or avoidance of nuisance conditions.

The environmental effects of elevated concentrations of CO, O_3, and PM10 are well known. CO, a product of incomplete combustion, interferes with oxygen transport to body tissues. O_3 is a component of photochemical smog; its major effects include irritation of the respiratory system and eyes and reductions in plant growth and crop yields. PM10 contributes to a wide range of pollution effects, such as reduced visibility, respiratory system irritation, corrosion of materials and structures, and economic effects related to soiling of materials.

For NO_2, SO_2, CO, and PM10, national ambient air quality standards (NAAQS) specify short-term (i.e., less than 24 hours) concentrations that may not be exceeded more than 1 time per year. For O_3, NAAQS also specify a 1-hour standard that may not be exceeded more than 3 days in a 3-year period. NAAQS also specify annual concentrations of NO_2, SO_2, CO, and PM10 that may not be exceeded.

California ambient air quality standards (CAAQS) specify concentrations that may not be exceeded. CO, O_3 precursors, and PM10 are of greatest concern for the LGRP because of the SFBAAB's nonattainment status for O_3 and PM10 and because construction of the project would result in emission of each of these pollutants.

Bay Area Air Quality Management District

The Bay Area Air Quality Management District (BAAQMD) is responsible for air quality in the SFBAAB. The BAAQMD, the first regional agency in California to deal with air pollution, was created by the state legislature in 1955. Its jurisdiction encompasses all of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa Counties, as well as southwestern Solano County and southern Sonoma County. The BAAQMD is governed by a board of directors composed of 21 publicly elected officials apportioned according to the populations of the represented counties. The board of directors has authority to develop and enforce regulations for controlling air pollution within BAAQMD jurisdiction.

By using a progressive approach to regulate air pollution, the BAAQMD has developed one of the most responsive air quality programs in the nation. The BAAQMD adopts reasonable air quality plans and supports those plans with sensible regulations (i.e., sensitive to socioeconomic impacts), flexible permitting, helpful compliance assistance, and proactive enforcement.

Table 3-23. Federal and State Ambient Air Quality Standards

		Standard (ppm)[a]		Standard (μg/m³)[b]		Violation Criteria	
Pollutant	Average Time	California	National	California	National	California	National
Ozone (O_3)	8 hours	–	0.08	–	160	–	If 3-year average of annual 3rd highest daily 8-hour maximum exceeds standard
	1 hour	0.09	0.12	180	235	If exceeded	If exceeded on more than 3 days in 3 years
Carbon monoxide (CO)	8 hours	9.0	9	10,000	10,000	If exceeded	If exceeded on more than 1 day per year
	1 hour	20	35	23,000	40,000	If exceeded	If exceeded on more than 1 day per year
	8 hours[c]	6	–	7,000	–	If exceeded	–
Nitrogen dioxide (NO_2)	Annual average	–	0.053	–	100	–	If exceeded
	1 hour	0.25	–	470	–	If exceeded	–
Sulfur dioxide (SO_2)	Annual average	–	0.03	–	80	–	If exceeded
	24 hours	0.04	0.14	105	365	If exceeded	If exceeded on more than 1 day per year
	1 hour	0.25	–	655	–	–	–
Hydrogen sulfide (H_2S)	1 hour	0.03	–	42	–	If equaled or exceeded	–
Vinyl chloride (C_2H_3Cl)	24 hours	0.01	–	26	–	If equaled or exceeded	–
PM10[d]	Annual geometric mean	–	–	30	–	If exceeded	–
	Annual arithmetic mean	–	–	–	50	–	If exceeded
	24 hours	–	–	50	150	–	If exceeded on more than 1 day per year
PM2.5[e]	Annual arithmetic mean	–	–	–	15	–	If spatial average exceeded on more than 3 days in 3 years

Table 3-23. Continued

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		Standard (ppm)[a]		Standard (μg/m³)[b]		Violation Criteria	
Pollutant	Average Time	California	National	California	National	California	National
	24 hours	–	–	–	65	–	If exceeds 98th percentile of concentrations in 1 year
Sulfate particles (SO_4)	24 hours	–	–	25	–	If equaled or exceeded	–
Lead (Pb)	Calendar quarter	–	–	–	1.5	–	If exceeded no more than 1 day per year
	30 days	–	–	1.5	–	If equaled or exceeded	–

Notes:

All standards are based on measurements at 25°C and 1 atmosphere pressure.
National standards shown are the primary (health effects) standards.

[a] = ppm = parts per million.

[b] = μg/m³ = micrograms per cubic meter.

[c] = Applies to Lake Tahoe only.

[d] = Particulate matter less than or equal to 10 microns in diameter.

[e] = Particulate matter less than or equal to 2.5 microns in diameter.

– =not applicable.

The *BAAQMD CEQA Guidelines: Assessing the Air Quality Impacts of Projects and Plans* (Bay Area Air Quality Management District 1996a) provides guidance to lead agencies, consultants, and other parties regarding air quality analyses conducted pursuant to CEQA. It also provides guidance on evaluating air quality impacts of development projects and local plans, determining whether an impact is significant, and mitigating significant impacts.

Existing Air Quality Conditions

California air-pollution control districts and the California Air Resources Board (ARB) routinely measure and report ambient air quality data. These data are summarized by ARB in quarterly and annual reports. The monitoring data summarized below and in table 3-24 were collected at the 4th Street station in San Jose, the closest monitoring station to the study area.

PM10

The 24-hour CAAQS for PM10 were exceeded 2–5 times per year from 1995–1999; however, there was no violation of the NAAQS for PM10 during the past 5 years.

Carbon Monoxide

There was no violation of NAAQS or CAAQS for CO during the most recent 5 years for which data are available.

Ozone

Fourteen violations of the CAAQS for O_3 were recorded in 4 of the 5 most recent years for which data are available. Two NAAQS violations were also recorded: 1 hour in 1995 and 1 hour in 1998.

Methods and Significance Criteria

The following criteria, based on the State CEQA Guidelines, were used to determine the significance of effects on air quality from implementation of each alternative. A project would result in a significant effect on air quality if it would

- conflict with or obstruct implementation of any applicable air quality plan,

- violate any air quality standard or contribute substantially to an existing or projected air quality violation,
- expose sensitive receptors to substantial concentrations of pollutants, or
- create objectionable odors affecting a substantial number of people.

The BAAQMD typically does not require construction emissions to be quantified when the effects of a project are analyzed (Bay Area Air Quality Management District 1999); however, feasible control measures for construction emissions of PM10 must be implemented to reduce the impacts to less-than-significant levels.

The impact analysis below assumes a 17,000 cfs floodflow. Potential impacts associated with the additional 1,350 cfs of interior drainage entering the Guadalupe River are addressed in chapter 4, "Cumulative Impacts."

Alternative 1: No Project

Under the No-Project Alternative, existing operations of the site would continue. Existing conditions would remain generally unchanged. No new impact on air quality would result from continued implementation of District management strategies in the project area.

Alternative 2: Floodwalls/Levee Raise (Proposed Project)

Impact: Construction-Related Air-Polluting Emissions

Construction of the Proposed Project, including excavation, earthmoving, and hauling of excavated soil to landfills or other disposal sites, is expected to generate air-polluting emissions. Emissions generated by construction-related activities in the BAAQMD are less than significant because the project incorporates all feasible PM10 control measures required by the BAAQMD.

The District will implement the project's environmental commitments (described below and in chapter 2, "Project Description"), including the BAAQMD's provisions for PM10 control. These environmental commitments will reduce construction-related impacts on air quality to a less-than-significant level. No mitigation is required.

Table 3-24. Summary of Air Quality Monitoring Data for Location Near Study Area

		Standard		Year				
Pollutant[a]	Parameter[b]	Federal	California	1995	1996	1997	1998	1999
PM10[c]	Annual geometric mean (µg/m^3)	50	30	21	22	23	22	25
	24 hours (2nd highest) (µg/m^3)	150	50	58	67	68	54	64
	Days above standard[d]			4	2	3	3	5
Carbon monoxide (CO)	Peak-hour value (ppm)	35	20	9	9	10	--	--
	Peak 8-hour value (ppm)	9.0	9.0	6.1	7.0	6.1	6.3	6.3
	Days above standard[e]			0	0	0	0	0
Ozone (O_3)	1-hour maximum (ppm)	0.12	0.09	0.13	0.11	0.09	0.15	0.11
	Days above standard[f]			14	5	0	4	3

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[a] Monitored from San Jose–4th Street monitoring station.

[b] µg/m^3 = micrograms per cubic meter.
ppm = parts per million.

[c] Inhalable particulate matter (particulate matter less than or equal to 10 microns in diameter).

[c] Days with 1 or more exceedance of the California PM10 standard.

[d] Days with 1 or more exceedance of the 8-hour CO standard.

[e] Days with 1 or more exceedance of the California O_3 standard.

Source: California Air Resources Board 2001.

The following measures, contained in the BAAQMD's *Feasible Control Measures for PM10 Emissions from Soil Removal Activities* (Bay Area Air Quality Management District 1996b), for controlling PM10 emissions will be implemented during the construction phase of the project.

- Water all active construction sites at least 2 times daily.
- Cover all trucks hauling soil, sand, and other loose materials, or require all trucks to maintain at least 2 feet of freeboard.
- Pave, apply water 3 times daily, or apply (nontoxic) soil stabilizers on all unpaved access roads, parking areas, and staging areas at construction sites.
- Sweep daily (with water sweepers) all paved access roads, parking areas, and staging areas at construction sites.
- Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets.

Alternative 3: Channel Bank Modification

Impact: Construction-Related Air-Polluting Emissions

Under the Channel Bank Modification Alternative, more construction than under the Proposed Project would be anticipated. Constructing channel modification structures in the lower Guadalupe River would involve excavating the inboard toe of the existing levees and constructing a vertical or nearly vertical wall with an apron at the resulting channel bench.

Construction of the Channel Bank Modification Alternative, including excavation, earthmoving, and hauling of excavated soil to landfills or other disposal sites, is expected to generate slightly greater air-polluting emissions than construction of the Proposed Project. Emissions generated by construction-related activities in the BAAQMD are considered less than significant because the project incorporates all feasible PM10 control measures required by the BAAQMD. No mitigation is required.

Alternative 4: Channel Bypass

Under the Channel Bypass Alternative, impacts from construction-related air-polluting emissions would be greater than under the Proposed Project because more extensive earth-moving construction activities would be required to remove existing levees and site bypass culverts, and then reconstruct levees. The same PM10 control measures as identified for the Proposed Project would be required for this alternative.

Baylands Mitigation Measure

Impact: Construction-Related Air-Polluting Emissions

Activities related to construction of flood-control structures under the Baylands Mitigation Measure include excavation; earthmoving; and hauling excavated soil from construction of inlet weirs and levees or floodwalls. PM10 emissions would require PM10-control measures, as indicated for the alternatives. These measures are included in the environmental commitments. No further mitigation is required.

Noise

Background

The following is a brief discussion of noise terminology used in this assessment.

- *Sound:* A vibratory disturbance created by a vibrating object, which, when transmitted by pressure waves through a medium such as air, is capable of being detected by a receiving mechanism, such as the human ear or a microphone.
- *Noise:* Sound that is loud, unpleasant, unexpected, or otherwise undesirable.
- *Decibel (dB):* A unitless measure of sound on a logarithmic scale, which indicates the squared ratio of sound pressure amplitude to a reference sound pressure amplitude. The reference pressure is 20 micropascals.
- *A-Weighted Decibel (dBA):* An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.
- *Equivalent Sound Level (L_{eq}):* The equivalent steady-state sound or vibration level that, in a stated period of time, would contain the same acoustic or vibration energy.
- *Day-Night Level (L_{dn}):* The energy average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the A-weighted sound levels occurring from 10 p.m. to 7 a.m.

In general, human sound perception is such that a change in sound level of 3 dB is just noticeable, a change of 5 dB is clearly noticeable, and a change of 10 dB is perceived as doubling or halving sound level.

Noise Regulations and Guidelines

Jurisdictions in California are required to have noise elements in their general plans; the noise elements are used as planning guides to ensure that noise levels are compatible with adjacent land uses. Most jurisdictions also have noise ordinances, which serve as enforcement mechanisms for controlling noise. San Jose does not have an adopted noise ordinance; limits on construction noise are addressed on a case-by-case basis as part of the City's project approval and permitting process.

To avoid significant adverse health effects related to noise, the City has established the following objectives as acceptable noise levels: 55 dB-L_{dn} as the long-term exterior noise level, 60 dB-L_{dn} as the short-term exterior noise level, 45 dB-L_{dn} as the interior noise level, and 76 dB-L_{dn} as the maximum exterior noise level. To achieve these noise objectives, the City requires that new residential development employ appropriate site and building design and incorporate noise attenuation measures in building construction; however, the noise element of the San Jose General Plan (City of San Jose 1994) recognizes that the exterior-noise-level goals will probably not be attained in the vicinity of San Jose International Airport and in the downtown core area during the timeframe of the current general plan.

Setting

Noise-sensitive land uses in the vicinity of the LGRP area are primarily residential subdivisions. Table 3-25 identifies the land uses on the east and west sides of the river along each reach.

Table 3-25. Land Uses in the Project Area

	Land Uses	
	East Side of the River	West Side of the River
Reach A	Commercial	Commercial
Reach B	Industrial	Industrial
Reach C	Industrial	Residential
Reach D	Commercial	Residential
Reach E	Commercial	Vacant
Reach F	Residential	Golf Courses
Reach G	Golf Courses	Residential

The existing noise environment within the LGRP area is typical for a developed urban/suburban area. Background sound levels in this type of area are typically in the range of 40–60 dBA, depending on the proximity to major traffic noise sources.

Methods and Significance Criteria

The following evaluation of construction noise effects was based on the assessment guidelines recommended by the Federal Transit Administration

(FTA) (Federal Transit Administration 1995). To assess construction noise effects, typical construction noise levels are predicted and compared with noise standards in local general plans.

The following criteria were used to determine the significance of noise-related effects. These criteria are based on the State CEQA Guidelines and professional judgment. The LGRP would have a significant effect on noise if it would

- expose persons to or generate noise levels in excess of standards established in the local general plan or noise ordinance or in applicable standards of other agencies,
- expose persons to excessive groundborne vibration or groundborne noise levels,
- cause a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project, or
- cause a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project

Noise effects were evaluated based on standards specified in the San Jose General Plan and the Santa Clara General Plan (City of San Jose 1994, City of Santa Clara 1992). In summary, if construction is anticipated to exceed 60 dB-L_{dn} at noise-sensitive land uses, the effect of the project on noise is considered significant.

Alternative 1: No Project

Under the No-Project Alternative, existing operations of the site would continue. Existing conditions would remain generally unchanged. No new noise impacts would result from the continued implementation of District management strategies in the project area.

Alternative 2: Floodwalls/Levee Raise (Proposed Project)

Impact: Temporary Increase in Noise Levels Resulting from General Construction Activities

General construction activities involved with grading and contouring banks and with constructing floodwalls or raising levees would result in a temporary increase in noise levels in the LGRP area. In addition, construction activities associated with either demolition and construction of the SR 237 eastbound bridge or construction of the bypass culvert option under the bridge would have temporary but long-term noise impacts on residences and other sensitive noise receptors within the vicinity of the bridge. Typical equipment to be used may include backhoes, concrete mixers, concrete pumps, loaders, and trucks. Table 3-26 summarizes typical L_{eq} noise levels produced by this equipment (Federal Transit Administration 1995).

Table 3-26. Construction Equipment Noise

Equipment	Typical Noise Level (dB-L_{eq}) 15.2 m (50 ft) from Source
Backhoe	80
Concrete Mixer	85
Concrete Pump	82
Loader	85
Pile Driver (Impact)	101
Pneumatic Tool	85
Truck	88

Source: Federal Transit Administration 1995.

A typical worst-case assumption would involve 1 concrete mixer, 1 loader, and 1 truck operating simultaneously. The combined sound level of these pieces of equipment is estimated to be 91 dB-L_{dn}. Construction noise levels at various distances from the source point were calculated using a point-source attenuation of 6 dB per doubling of distance and nominal atmospheric effects (Hoover 1996).

Table 3-27 shows estimated construction noise levels in the vicinity of an active construction site and lists the assumptions on which the noise level calculations were based. Predicted L_{dn} values are estimated based on the following operational assumptions:

24-hour construction—add 3 dB to L_{eq} value
6 a.m.– 3 p.m.—subtract 1 dB from L_{eq} value
7 a.m.– 5 p.m.—subtract 3 dB from L_{eq} value

Table 3-27. Estimated Construction Noise in the Project Area

Distance Attenuation

Distance to Receptor (feet)	Sound Level at Receptor (dB-L_{eq})
50	91
100	85
200	79
400	72
600	68
800	66
1,000	63
1,500	59
2,000	56
2,500	53
3,000	50

The following assumptions were used:

- Basic sound level dropoff rate: 6.0 dB per doubling of distance.
- Molecular absorption coefficient: 0.7 dB per 1,000 feet.
- Analous excess attenuation: 1.0 dB per 1,000 feet.
- Reference sound level: 91 dB-L_{eq}.
- Distance for reference sound level: 50 feet.

Notes: This calculation assumes simultaneous operation of 1 concrete mixer, 1 loader, and 1 truck.

To estimate L_{dn} value:

- Add 3 dB to L_{eq} for 24-hour operation.
- Subtract 1 dB from L_{eq} for operation from 6 a.m. to 3 p.m.
- Subtract 3 dB from L_{eq} for operation from 7 a.m. to 5 p.m.

As indicated in table 3-27, sensitive receptors within about 300 m (1,000 feet) of the construction site could be exposed to construction noise in excess of 60 dB-L_{dn}; therefore, construction noise could temporarily affect some residences within about 300 m (1,000 feet) of the LGRP in reaches C and D~~, and F~~. Construction noise impacts on approximately 30-40 residences located adjacent to the reach C west levee would occur and would likely exceed the 60 dB-Ldn but would be less severe than in other construction areas because levee improvements at this location would only involve adding approximately 0.5 meter (1.6 feet) of engineered fill to the top of the existing levee and constructing new maintenance roads on levees. Similarly, noise impacts associated with proposed levee improvements adjacent to the Mansion Grove Apartments and The Carlyle, a gated higher density development located on the west side of reach D levees would involve construction equipment necessary to raise levees approximately 0.7 meter (2.3 feet). The distance of residential areas in these reaches from LGRP levees in some cases is less than 50 feet; however, the total number of residential units potentially affected by these construction activities would not exceed approximately 100 units. Because the District has already incorporated environmental commitments into the Proposed Project that restrict construction hours, require sound control devices on all equipment, and require designating a noise abatement coordinator, and because the duration of noise at these construction sites would be only about 3-4 weeks, these temporary noise impacts are considered less than significant even though a relatively small number of residents could experience elevated noise levees on a temporary basis. Levee construction on 6.5 miles of the lower Guadalupe River would encounter only a few locations where potential noise impacts could affect residential areas. ~~Because the duration of construction-related noise impacts would be approximately 3–4 weeks and increased noise from construction would be temporary and short term in any particular river reach, these impacts are considered less than significant. No mitigation is required. In addition, implementation of the environmental commitments identified below would further reduce these temporary impacts.~~

Impact: Temporary Increase in Noise Levels Resulting from Pile-Driving Activities

Operation of a pile driver would result in a temporary increase in noise levels during daytime hours. Table 3-26 summarizes typical L_{eq} noise levels produced by an impact pile driver (Federal Transit Administration 1995). Table 3-28 shows estimated noise levels that could be expected in the vicinity of active pile-driving sites during backwall foundation construction in reaches B–G and at SR 237, and lists the assumptions on which the noise level calculations were based. As indicated in table 3-28, sensitive receptors within about 900 m (3,000 feet) of the pile-driving site could be exposed to construction noise in excess of 60 dB-L_{dn}. The maximum duration of pile-driving noise impacts would be 3–4 weeks at any one location and noise impacts southeast of the SR 237 bridge, northeast of Tasman bridge, and southwest of Montague bridge, would be reduced by constructing ~~a~~ temporary sound walls or equivalent noise reduction measures adjacent to the residential areas ~~a mobile home park~~. Because increased noise from pile-driving equipment would be temporary and short term at sensitive locations, and environmental commitments identified below would be implemented, the impacts are considered less than significant. No mitigation is required.

Environmental Commitments

The District and its contractors will employ the following noise-reducing construction practices:

- All construction will be done between the hours of 7 a.m. and 5 p.m.
- All equipment will have sound-control devices no less effective than those provided on the original equipment, and all equipment will be operated and maintained to minimize noise generation.
- No equipment will have an unmuffled exhaust.

Table 3-28. Estimated Pile-Driving Noise in the Project Area

Distance Attenuation

Distance to Receptor (feet)	Sound Level at Receptor (dB-L_{eq})
50	101
100	95
200	89
400	82
600	78
800	76
1,000	73
1,500	69
2,000	66
2,500	63
3,000	60

The following assumptions were used:

- Basic sound level dropoff rate: 6.0 dB per doubling of distance
- Molecular absorption coefficient: 0.7 dB per 1,000 feet.
- Analous excess attenuation: 1.0 dB per 1,000 feet.
- Reference sound level: 101 dB-L_{eq}.
- Distance for reference sound level: 50 feet.

Notes: This calculation assumes the use of an impact pile driver.

To estimate L_{eq} value:

- Add 3 dB to L_{eq} for 24-hour operation.
- Subtract 1 dB from L_{eq} for operation from 6 a.m. to 3 p.m.
- Subtract 3 dB from L_{eq} for operation from 7 a.m. to 5 p.m.

- The District will designate a "noise abatement coordinator" who will be responsible for responding to any local complaints about construction noise. The telephone number of the noise abatement coordinator will be posted at the construction site and included in notices sent to residents within 300 m (1,000 feet) of the lower Guadalupe River regarding the construction schedule. The noise abatement coordinator will determine the cause of noise complaints (e.g., starting too early, bad muffler) and will require that reasonable measures to correct the problem be implemented. The District will be responsible for posting and providing notices of construction schedules to residents, and will give the noise abatement coordinator's name and telephone number to the directors of the City Department of Planning, Building and Code Enforcement; the City of Santa Clara Planning and Inspection Department; and the Santa Clara County Planning Office.

Alternative 3: Channel Bank Modification

Impact: Temporary Increase in Noise Levels Resulting from Construction Activities

General construction activities under the Channel Bank Modification Alternative would result in a temporary increase in noise levels in the Project area associated with channel modification activities and levee construction. Excavation and construction necessary for the possible relocation of the Hetch Hetchy Aqueduct would produce additional noise. Typical equipment to be used may include backhoes, concrete mixers, concrete pumps, loaders, and trucks. Table 3-26 summarizes typical L_{eq} noise levels produced by this equipment (Federal Transit Administration 1995). Noise levels are expected to be similar to those described for the Proposed Project except that most of the construction activity under this alternative would occur on the inboard side of levees in reaches D–G.

As indicated in table 3-27 and described under the Proposed Project, sensitive receptors within about 300 m (1,000 feet) of the construction site could be exposed to construction noise in excess of 60 dB-L_{dn}; therefore, this impact is considered to be significant for the same reasons identified for the Proposed Project. As under the Proposed Project, implementation of the project's environmental commitments would reduce this impact to a less-than-significant level; therefore, no mitigation is required.

Impact: Temporary Increase in Noise Levels Resulting from Pile-Driving Activities

Operation of a pile driver would result in a temporary increase in noise levels during daytime hours similar to that described for the Proposed Project. As indicated in table 3-28, sensitive receptors within about 900 m (3,000 feet) of the pile-driving site could be exposed to construction noise in excess of 60 dB-L_{dn}, which would include up to approximately 100 residences mainly in reaches C, D, F, and G. Even with implementation of environmental commitments, noise levels from pile-driving activities could exceed ambient noise-level standards. This impact is considered significant and unavoidable.

Alternative 4: Channel Bypass

Under the Channel Bypass Alternative, temporary increases in noise levels from construction activities would be similar to those under the Proposed Project except that increased construction noise levels would last longer than under the Proposed Project because the project would take longer to complete. The same measures identified for the Proposed Project would be required for this alternative (please refer to "Environmental Commitments" in chapter 2).

Baylands Mitigation Measure

Activities in the baylands associated with the LGRP would include the possible construction of a weir within specific areas of the Cargill salt ponds.

Any construction activities would be temporary and short-term and would be far enough from noise-sensitive receptors to have a less-than-significant impact on noise levels. Activities within close proximity to Alviso and noise-sensitive receptors may include construction of levees and a floodwall. Noise impacts associated with these activities would be considered less than significant because they would be temporary and occur during daytime hours. In addition, implementation of the project's environmental commitments would further reduce noise levels. No mitigation is required.

Public Services and Utilities

Public utilities and the structures associated with them adjacent to the east and west levees of the LGRP consist mainly of water pipelines and pump stations, storm drains and outfalls, overhead electrical lines, existing and proposed gas pipelines, sanitary sewer systems, and underground fiber-optic cable lines. The City is responsible for providing sanitary sewer service and maintaining the storm drain system. PG&E maintains electrical and gas lines. The San Jose Water Company provides water and maintains water pipelines. Pacific Bell maintains the telephone infrastructure, and AT&T Cable maintains the cable television system. The City Fire Department and the City Police Department provide fire protection and police protection. The following is a discussion by reach of public utilities in the LGRP area.

Reach A

A sanitary sewer pipeline, a storm drain, and a water pipeline run the entire length of the west side of the reach from I-880 to U.S. 101. Underground electrical lines and a gas line also run the entire length of the river, but are intermittent. The electrical lines terminate near Sta 16+600W, begin again at approximately Sta 15+700W, and continue to U.S. 101. An overhead electrical line, also on the west side of the river, runs from I-880 to approximately Sta 15+600W, where it crosses the river and runs along the east side past U.S. 101.

A storm drain runs west to east on the west side of the river at Sta 17+600W, terminating at an outfall. Another storm drain originates on the west side, just north of Sta 17+500W, and runs west to east, terminating at an outfall at approximately Sta 17+450W, with another outfall immediately across the river on the east side. Immediately downstream on the west side, near Sta 17+375W, another outfall connects to the storm drain that runs the entire length of the reach. Three overhead electrical lines connect to the main overhead lines on the west bank at approximately Sta 17+180W and run west to east across the river. A water pipeline (running west to east) in the same vicinity connects to the main water pipeline that runs the entire length of the reach on the west side. There are 2 storm drain pipelines on the east side of the river (at approximately Sta 17+275W and Sta 17+050W); however, these pipelines are east of the parkway and far removed from the river. A sanitary sewer line (approximately Sta 17+010W) and a water line (approximately 16+960W) connect to the main lines on the west bank and run west to east across the river.

Downstream at about Sta 16+700W, overhead electrical lines connect to the main lines on the west bank and run west to east across the river. Near this point, a west-to-east water line connects to the main water line on the west bank, and 2 storm drains running east to west terminate at 2 outfalls on the east bank of the river. There are 2 more outfalls just downstream on the west bank at approximately Sta 16+600W and Sta 16+400W. The main storm drain that runs the length of the reach on the west side terminates at approximately Sta 16+750W, but begins again near Sta 16+700W, runs west and around nearly the entire west side of the airport parking lot, turns sharply east, then north, just upstream of Sta 15+900W, and continues to U.S. 101. At about this location, a water pipeline connects to the main water pipeline. A short water pipeline on the west side of the river at approximately Sta 16+325W connects to the main water pipeline that runs the length of the reach.

At approximately Sta 15+700W and Sta 15+550W, respectively, a sanitary sewer line and a water pipeline cross the river, running west to east. The sanitary sewer line crosses under the roadway just east of the river and continues east. There are 2 outfalls on the west bank near Sta 15+700W; on the east side of the river, a storm drain runs east to west, crosses under the roadway, and terminates at an outfall at approximately Sta 15+650E. The overhead electrical lines that run the length of the reach cross the river near Sta 15+650W and continue northeasterly past U.S. 101. Another set of overhead electrical lines originate on the west bank near Sta 15+700W, run along the west bank until approximately Sta 14+950W, where they cross the river and continue north, terminating at approximately Sta 14+650E. There are 3 outfalls on the west bank at approximately Sta 15+510W, 15+460W, and Sta 15+400W. A storm drain running west to east connects to the main storm drain and outfall at Sta 15+450W. There is a storm drain, pumphouse, and outfall on the east bank at approximately Sta 15+430E; 2 more outfalls are located just downstream of these structures at approximately Sta 15+325E.

Downstream on the west side of the river, 2 storm drains running west to east connect to the main storm drain at approximately Sta 15+230W and Sta 14+800W. There are 2 outfalls on the west bank at approximately Sta 14+800W and Sta 14+760W. At Sta 14+700W, a water pipeline connects to the main water pipeline and runs east across the river where it terminates east of the river. Another water pipeline begins on the east bank at Sta 14+700E and runs south to Sta 15+150E. The gas line and the underground electrical lines (which split off the main underground lines) that run the length of the reach on the west bank also cross the river at Sta 14+700W. The gas line terminates just east of the river at the same river station point;

the underground electrical lines continue south on the east side of the river and terminate near Sta 15+150E. A small outfall is located on the east bank at approximately Sta 14+650E.

Reach B

There are 2 sanitary sewer outfalls on the east bank (Sta 14+290E) of the river, approximately 200 m (656 feet) north of U.S. 101, and 2 on the west bank, approximately 450 and 500 m (1,476 and 1,640 feet) north of U.S. 101 (Sta 14+038W and 14+007W). One 38-cm (15-inch) and one 61-cm (24-inch) sanitary sewer line begin on the west side of the river at Sta 14+050W, approximately 460 m (1,509 feet) north of U.S. 101, and run east across the river. On the east bank, the 2 lines combine into a single line at approximately Sta 14+030E. The remaining sanitary sewer line continues north, runs to just south of Trimble Road, turns east again, and continues parallel to the road. Another sanitary sewer line runs from the west bank at approximately Sta 13+930W, crosses the river, and runs north to Trimble Road, where it is attached to Trimble Bridge and continues east.

There is one 137-cm (54-inch) and one 106.7-cm (42-inch) storm drain outfall on the west bank at approximately Sta 13+950W and Sta 13+930W, respectively, approximately 230 m (755 feet) south of Trimble Road.

Reach C

Three fiber optic cable lines run west to east across the river immediately north of Trimble Road at Sta 13+692W and continue parallel to Trimble Road. There are two 91.4-cm (36-inch) storm drain outfalls and an underground electrical line on the west bank at approximately Sta 13+679W, immediately north of Trimble Road. A 25.4-cm (10-inch) nitrogen pipeline is proposed on the west side of the river at approximately Sta 13+550W. The pipeline would cross the river, run south to approximately 15 m (49 feet) north of Trimble Road, and then turn east and run parallel to the road. There is a pump station and a storm drain outfall at approximately Sta 13+500, about 200 m (656 feet) north of Trimble Road. It is not clear from the data whether this outfall is on the east or west side of the river. There is another 152.4-cm (60-inch) storm drain outfall on the west side of the river at Sta 13+329W, approximately 375 m (1,230 feet) north of Trimble Road and a pump station and a 168-cm (66-inch) storm drain outfall on the west levee at approximately Sta 13+267W, about 440 m (1,476 feet) north of Trimble Road.

A high-voltage, overhead electrical line runs north along the west bank of the river from approximately Sta 12+798W, about 1 km (0.62 mile) north of Trimble Road, to Montague Expressway. There is one 137-cm (54-inch) and one 122-cm (48-inch) storm drain outfall and a pump station on the west bank at Sta 12+476W, approximately 570 m (1,870 feet) south of Montague Expressway. A 168-cm (66-inch) storm drain outfall lies on the west bank immediately south of Montague Expressway at Sta 11+840W. Part of the storm drain connected to this outfall branches off and runs north under Montague Expressway.

Reach D

The Rincon pump station and storm drain outfall are on the east side of the river, immediately north of Montague Expressway at Sta 11+795E, and the Lick Mill pump station and storm drain outfall are on the west side of the river at Sta 11+761W, approximately 350 m (1,148 feet) north of Montague Expressway. The storm drain on this side of the river runs parallel to the river from approximately Montague Expressway north to approximately Sta 11+750W. One sanitary sewer outfall (size unknown) lies on the west bank at approximately Sta 11+246W, about 550 m (1,804 feet) north of Montague Expressway, and another (46 cm [18 inches]) at Sta 11+056W, approximately 750 m (2,460 feet) north of Montague Expressway. The River Oaks pump station and outfall are on the east bank at Sta 11+964E, approximately 860 m (2,822 feet) north of Montague Expressway. There are 5 storm drain outfalls of various sizes along the west bank of the river at Sta 10+863W, Sta 10+756W, Sta 10+644W (2), and Sta 10+536W. The Fairway Glen pump station and 5 outfalls are on the west bank, immediately south of the Hetch Hetchy Aqueduct at Sta 10+164W. At the same location, an underground electrical line feeds into the pump station.

Reach E

Two Hetch Hetchy water pipelines, one 229 cm (90 inches) in diameter and one 183 cm (72 inches) in diameter, run from west to east across the river at Sta 10+137. A 61-cm (24-inch) gas pipeline runs west to east across the river at Sta 10+069, approximately 70 m (230 feet) north of the Hetch Hetchy Aqueduct. A 76-cm (30-inch) reclaimed-water pipeline is proposed on the west bank of the river, approximately 100 m (328 feet) south of Tasman Drive at Sta 9+300W. There are 3 storm drains and an underground electrical line at the same location. The storm drains run north and parallel to the west bank of the river from Sta 9+300W (south of Tasman Drive) to just north of Tasman Drive. There are 3 outfalls on the west bank of the river at approximately Sta 9+760, Sta 9+550, and Sta 9+350.

Reach F

A 15-cm (6-inch) nitrogen pipeline is proposed from approximately Sta 9+125W to Sta 9+250E, immediately north of Tasman Drive. A 76-cm (30-inch) reclaimed-water pipeline runs across the river at approximately the same location. At the west bank, the pipeline extends north from approximately Sta 9+205W to Sta 8+140W to about 50 m (164 feet) south of SR 237. There is a storm drain and outfall on the west bank at Sta 8+988W, approximately 250 m (820 feet) north of Tasman Drive. The Oakmead pump station and outfall are on the east bank of the river at Sta 8+643E, approximately 600 m (1,969 feet) south of SR 237. The Oakcrest Estates pump station is just east of the river levee at Sta 8+344E, and the 35.6-cm (14-inch) Oakcrest storm drain outfall lies on the east bank at Sta 8+334E, approximately 300 m (984 feet) south of SR 237. There is a storm drain outfall of unknown size on the west bank of the river at Sta 8+198W. A gas pipeline runs west to east across the river at approximately Sta 8+146, about 100 m (328 feet) south of SR 237. Overhead electrical wires on the west bank of the river extend north from approximately Sta 8+140W to approximately Sta 8+100W. Two sanitary sewer lines run across the river at Sta 8+100 and cross over SR 237 just east of the east levee. The West Side pump station and 2 storm drain outfalls are on the west bank at Sta 8+096W, immediately south of SR 237. A reclaimed-water pipeline at the same approximate location on the west bank runs across the river immediately south of SR 237 and then north under SR 237, just east of the east levee. A 31-cm (12-inch) water pipeline near Sta 8+000 feeds into the West Side pump station. The water pipeline on the east bank near Sta 8+094E splits into 2 pipelines, one running north under SR 237 and the other running southeast.

Reach G

A potable-water pipeline runs across the river just north and parallel to SR 237. There is a storm drain outfall on the west bank of the river, at approximately Sta 7+900W. The Summerset Mobile Home Park pump station and storm drain outfall are on the west bank of the river at Sta 7+695W, approximately 400 m (1,312 feet) north of SR 237. A 53.3-cm (21-inch) storm drain outfall lies on the west bank at Sta 7+417W, approximately 320 m (1,050 feet) south of the Gold Street bridge, and there is a 35.4-cm (10-inch) storm drain outfall on the west bank at Sta 7+251W, approximately 150 m (492 feet) south of the Gold Street bridge. Alviso Pump Station 13 and outfall are on the east bank of the river at Sta 7+209E, approximately 100 m (328 feet) south of the Gold Street bridge. Alviso

Pump Station 12 and outfall are located on the west bank at Sta 7+109W, immediately south of the Gold Street bridge. A potable-water pipeline and sanitary sewer line run across the river from the west bank to past the east bank along Gold Street bridge. Several overhead electrical wires cross the river diagonally from approximately Sta 7+200W to Sta 7+350E, south of the Gold Street bridge, and from 6+950W, north of the Gold Street bridge, to 7+300E approximately 200 m (656 feet) south of the bridge.

Methods and Significance Criteria

Analysis of alternatives is based on digital information showing the location and extent of utilities and structures within the lower Guadalupe River reaches and the approximate locations of the proposed construction activities.

The following criteria were used to determine the significance of impacts on public services. These criteria are based on the CEQA Guidelines and on CEQ's NEPA regulations. The LGRP would have a significant effect on public services if it would

- cause a significant disruption of public services,
- affect the provision of or need for governmental facilities, or
- affect the ability to maintain acceptable service ratios and response times.

The impact analysis below assumes a 17,000 cfs floodflow. Potential impacts associated with the additional 1,350 cfs of interior drainage entering the Guadalupe River are addressed in chapter 4, "Cumulative Impacts."

Alternative 1: No Project

Under the No-Project Alternative, routine maintenance for vegetation control would continue in reaches A–G. Routine maintenance for vegetation control would have no effect on public services or utilities. No mitigation is required.

Alternative 2: Floodwalls/Levee Raise (Proposed Project)

Impact: Possible Temporary Disruption in Public Utilities from LGRP Construction

Construction and structural elements associated with the Proposed Project, such as contouring the riverbanks, constructing floodwalls, and raising the SR 237 bridge have the potential to temporarily disrupt public services and utilities, including water, wastewater, gas, electricity, telephone, and cable television. Specifically, construction activities associated with excavating for new floodwalls or backwalls adjacent to the outboard toe of levees in reaches B–G could affect underground utilities. Structures that cross the river comprise overhead electrical lines and underground utilities, including water systems and some gas lines near Tasman Drive, SR 237, and the Hetch Hetchy Aqueduct.

The Proposed Project would also involve demolition of the SR 237 eastbound bridge and reconstruction to increase the height of the SR 237 bridge, or a bypass culvert option. Reconstruction of the bridge would require excavation for new pilings and possible rerouting of the utilities in the immediate area, such as the sanitary sewer, reclaimed-water, and water pipelines that run from west to east and across the river. These lines run parallel to and then cross under SR 237 on the east bank of the river. A pump station on the west bank, just upstream of SR 237, may also be affected by construction activities. The potential for impacts on utilities from the SR 237 bypass culvert option would be similar to impacts associated with bridge replacement.

Construction under the Proposed Project would not require new wastewater treatment or expanded stormwater facilities, and would not involve consumptive use of water or increased demand for public services; however, it would require relocation or modification of a potentially large number of underground utility lines and drainage outfalls that cross or are adjacent to LGRP levees. This potential impact on utilities in the project vicinity is considered less than significant because the District would coordinate with utility companies and contact service providers before construction begins to ensure that utility lines or services are not affected by LGRP construction. No mitigation is required. Refer to chapter 2 under "Environmental Commitments."

Impact: Potential for Delay in Emergency Response Times During SR 237 Bridge Construction

Under the Proposed Project, construction of the SR 237 bridge would require implementation of a construction phasing plan to ensure that all eastbound lanes of SR 237 remain open during peak traffic periods. This plan is described in detail in chapter 5 of the Engineer's Report. The potential exists for delays in emergency response times related to restrictions in traffic flow across the bridge during nonpeak hours because some of the traffic lanes may need to be closed during parts of the day. This impact is considered less than significant because the LGRP would be required to implement a traffic control plan that meets Caltrans requirements. No mitigation is required.

Alternative 3: Channel Bank Modification

Impact: Possible Temporary Disruption in Public Utilities from LGRP Construction

The temporary impacts on public utilities and services from construction of floodwalls, backwalls, and channel bank modification structures associated with the Channel Bank Modification Alternative would be similar to those of the Proposed Project. Construction activities that would involve excavation below the existing levee inverts, such as for levee backwalls or during construction of foundations for the channel bank modification structures in reaches B–G, could result in the need to relocate existing utilities. The Channel Bank Modification Alternative could also require realignment of the Hetch Hetchy Aqueduct pipelines at the boundary separating reaches D and E, but these pipelines would be realigned one at a time to provide uninterrupted service. Impacts associated with disruption of public utilities under this alternative are considered less than significant for the same reasons identified for the Proposed Project. No mitigation is required.

Alternative 4: Channel Bypass

Under the Channel Bypass Alternative, there would be greater impacts on public utilities that cross the District's ROW than identified for the Proposed Project because siting bypass culverts would require excavating areas under the invert of levees that would not be affected under the Proposed Project. Coordination with utility providers and contact of service providers before construction begins would be required. This alternative would also have the impact of delays in emergency response times similar to that of the Proposed Project because construction of bypass culverts at SR 237 and other bridges would most likely result in construction-related traffic delays.

Baylands Mitigation Measure

Construction activities associated with the Baylands Mitigation Measure would be concentrated near Alviso, Pond A6, and the Cargill salt ponds. Because there are no utilities other than overhead electrical lines, there would be no impact on public services or utilities associated with construction activities. Flooding of Pond A6 will not result in a significant impact to the PG&E transmission towers in Pond A6. No mitigation is required.

Cultural Resources

Prehistory

Results from previous archaeological investigations within the LGRP area and the surrounding region have shown that the San Francisco Bay Area was inhabited by mobile hunter-gatherers. Over time, their foraging strategies became more focused on the locally obtainable resources and their lives became increasingly more sedentary.

Throughout the Late Holocene, the environment of the southern Bay Area continued to evolve into what became a local tidal marsh/wetland~~s~~. The prehistoric population created massive shell mounds in which the dominant species of shellfish were hornsnail, oyster, clam, and bay mussel. Sites closer to the bay demonstrate a subsistence based on tidal marsh resources~~;~~ ~~while~~ and the interior valley sites to the north reveal an emphasis on terrestrial resources (Allen et al. 1998).

The Emergent Period (A.D. 1200–1777) in the southern Bay Area is characterized by an elaborate social organization and the formation of small autonomous sociopolitical groups called *tribelets*. An economic relationship was maintained among the many small groups and trade was frequent between the coastal groups and the valley/bayshore groups. Artifacts from this period include well-shaped mortars and pestles, decorated *olivella* shell beads, rectangular olivella beads, tubular stone pipes, and many small projectile points that were used with the bow and arrow. *Haliotis* (abalone shell) pendants and large amounts of olivella beads, beautifully crafted shell ornaments, are found in association with graves as well. Olivella beads were commonly found on ocean beaches along the central California coast. According to ethnographic studies from researchers such as Alfred Kroeber (1925), this was the way of life of the native people in the southern Bay Area upon contact with the European explorers.

Ethnography

At the time of European contact, the Santa Clara Valley region was occupied by a group of Native Americans whom the ethnographers refer to as the *Ohlone* or *Costanoan*. The Ohlone are a linguistically defined group composed of several autonomous tribelets speaking 8 different, but related languages. The LGRP is located in the Tamyen linguistic area, which shares many cultural traits with other linguistic groups in the Ohlone region. The territory of the Ohlone people extended along the coast from Golden Gate in the north to just beyond Carmel in the south, and as many as 60 miles inland. (Levy 1978).

The Ohlone were hunter-gatherers and relied heavily on acorns and seafood. They also exploited a wide range of other foods, including various seeds (the growth of which was promoted by controlled burning), buckeye, berries, roots, land and sea mammals, waterfowl, reptiles, and insects. The Ohlone used tule balsas for watercraft, and used the bow and arrow, cordage, bone tools, and twined basketry to procure and process their foodstuffs (Levy 1978).

Seven Spanish missions were founded in Ohlone territory between 1777 and 1797. Mission life was devastating to the Ohlone population. It has been estimated that in 1770, when the first mission was established within Ohlone territory, the Native American population numbered about 10,000; the population rapidly declined to less than 2,000 by 1832 as a result of introduced disease, harsh living conditions, and reduced birth rates (Levy 1978). Today, descendants of the Ohlone still live in the area, and many are active in maintaining their traditions and advocating for Native American issues.

History

In the 18th century, the ~~The~~ Spanish government sent a military expedition to ~~the New World~~ Alta California to explore the region for harbors that could provide secure military bases, called *presidios*. The presidios were important for the colonization of an area and the protection of the settlers. Don Gaspar de Portola, the leader of the first expedition in 1769, found both Monterey and San Francisco Bays and crossed through Santa Clara Valley, thereby discovering the Guadalupe River. Portola was accompanied by Father Juan Crespi, whose objective was to assess the area's suitability for establishing ~~a~~ Franciscan missions. ~~The Guadalupe River became the central feature of the Spanish colonial settlement. Portola was accompanied by Father Juan Crespi, whose objective was to assess the area's suitability for establishing a Franciscan mission~~. The area's rich soil, good potential pasture lands, and large numbers of Native Americans living in the region created optimum conditions for placement of a mission. The Guadalupe River became the central feature of the Spanish colonial settlement in the Santa Clara Valley.

Four more expeditions traveled through Santa Clara Valley during the next 7 years. The last expedition was headed by Colonel Juan Bautista de Anza, who crossed the Guadalupe River in 1776 and chose the site for the Mission Santa Clara. The mission was officially established on January 12, 1777. At the time, there were more than 40 ~~rancherias, small communities of~~ Native Americans villages ~~and their extended families,~~ within a radius of approximately 10 miles (Spearman 1963).

Another Spanish colonization effort was the *pueblo*. Pueblos were civil settlements that supplied agricultural products and provided an example of proper Spanish society to the natives. The first pueblo established along the Guadalupe River consisted of 66 settlers and retired soldiers led by Commander Jose Joaquin Moraga. Pueblo San Jose de Guadalupe was established on November 29, 1777.

In 1824, Mexico won independence from Spain and subsequently became a republic of states. One of the first acts of the new government was to secularize the missions and redistribute the mission holdings. Although secularization was intended to distribute the mission lands to the settlers and native population, the Rancheros, large ranches where nonnative settlers lived, eventually came to claim~~ed~~ the bulk of the resources. These lands were redistributed in the form of land grants to individuals who promised to work the land, primarily by raising cattle. These cattle ranches became the driving force in the economy and the dominant culture of the California, including the Santa Clara Valley.

One of the Mexican land grants within the vicinity of the LGRP area was the Embarcadero Santa Clara Land Grant of the Bernal family. The grant was passed down to Barcelina Bernal and John Martin, who occupied ~~the~~ an adobe in the 1830s and 1840s. Although the adobe no longer stands, the estimated location of this site is south of Alviso near the intersection of SR 237 and the lower Guadalupe River.

Other land grants in the area include the Rancho Rincon de los Esteros to the Berryessa family and the Rancho Rincon de los Esteros to the Alviso family. Three adobe houses belonging to the Berryessa family during this period were located within the LGRP area. Historic maps from 1859 (Wallace 1859) show these adobes located just south of the previously mentioned adobe along the lower Guadalupe River and just south of present-day SR 237. Just north of the Martin/Barcelina adobe was the site of 2 Alviso family adobes as well. The location of the Alviso family adobes is recorded as on the bank of a curve in the river. The exact location is not known.

Alviso is considered one of the earliest ports on the west coast. The Embarcadero for Mission Santa Clara provided a landing on the Guadalupe River at the head of what once was a navigable slough from the San Francisco Bay. Established in about 1790, the original Embarcadero was apparently located about one-half mile south of the current town. Since the region lacked other efficient means of transport through the 1850s, ships from San Francisco Bay were crucial for the growth of the mission and other rancho trade.

The latter half of the 19th century was a dynamic period of history in the Santa Clara Valley. In 1848, the United States won the battle for one-half of Mexican territory, which would become California, Nevada, Arizona, New Mexico, Texas, and Colorado. Within weeks of the end of the war, gold was discovered in the American River in the Sierra Nevada foothills. By summer 1849, word of the gold deposits in California had spread to the world and thousands of people were arriving in California in search of their fortunes. Beginning in the 1870s, there was a transition from grain farming to fruit farming in the Santa Clara Valley. ~~Although very few farmers specialized in fruit in the 1870s, by~~ By the 1890s, fruit farming was the dominant agricultural activity in the Santa Clara Valley. ~~The late 19th century saw an accelerated development of industry throughout the Santa Clara Valley. In particular, the rise of mining technology and mills added to the complex shift to industrialization.~~

James Lick came to San Francisco in 1848 after traveling and building his fortune in South America. He built a flour mill on the Guadalupe River in 1855, where he also established a residence, a mill pond, and an 81-hectare (200-acre) farm. He was able to produce 200 barrels of flour a day. Lick personally contributed to the agricultural development of Santa Clara Valley. He also became one of the pioneer fruit growers in the region, an industry that dominated economic activity of the Santa Clara Valley for decades, beginning in the 1870s and 1880s.

A group of investors purchased the Lick Mill in 1873 and converted it into the Saratoga Paper Manufacturing Company. The increase in fruit production and wide distribution created a need for the product because the fruit traveled best wrapped in paper. In 1880, the company was reorganized as the Lick Paper Company and began to manufacture paper for the *San Jose Mercury* and the *San Francisco Examiner* in 1882. The main building of the paper company burned in a fire the same year.

The town of Alviso, however, saw relatively little growth in the later half of the 19th century. California's new railroads diverted trade away from bay ports and shipping began competing for freight and passengers with the railroad. The San Francisco and San Jose Railroad, completed in 1864, declined to construct its line as far as Alviso. Alviso remained a regional shipping port until at least the late 1890s, though the self-proclaimed potential to became a great shipping center never materialized.

Agricultural-related industry had a place in Alviso throughout the late 19th and early 20th centuries. During the 1870s and 1880s, the extensive development of fruit and vegetable agriculture included strawberries, raspberries, blackberries, asparagus, tomatoes, apples, and pears. At least three seed ranches were established near Alviso. Alviso also became the site of a successful cannery whose remains still stand. A man named Sai Yin Chew had founded the Precita Canning Company in San Francisco in 1890 but moved to Alviso after the 1906 earthquake, reorganizing under the name Bay Side (or Bayside) Cannery. By the 1920s, the Bayside Cannery was one of the major canneries of the Santa Clara Valley. The company employed 400 to 500 Chinese workers in 1922, many of whom lived in company-owned housing near the factory.

San Francisco Bay provided another business for Alviso's limited economy, which permanently changed the landscape of the surrounding wetlands—solar salt manufacture. A large demand for salt, from the mining and food industries throughout the west, and an ideal natural environment, including natural salt marshes and vast acres of flat land, combined to create an ideal location for solar salt production. Aside from mechanized harvesting, the general production and configuration of salt ponds have changed little since the 19th century. The Alviso Salt Company was incorporated in 1926, although its precursor was incorporated as early as 1900. The Alviso Salt Company improved lands with levees and ponds in 1929, but only operated for 1 year before abandoning plans for warehouses, machine shops, offices, and cottages and finally dissolving as a company in 1938. The Leslie Salt Company purchased its competitor and demolished most of the associated structures, retaining only the ponds and levee system for its own use. By 1978, the Leslie Salt Company became a subsidiary of Cargill, Inc., and the property officially changed its names to Cargill Salt in 1991.

During the period after World War II, the once primarily agricultural area experienced dense population growth and urbanization as commercial centers and the high-tech industry of Silicon Valley grew to prominence.

The project area has a varied and expansive history relating to agriculture, mining, transportation, and industry. ~~Most likely, there are remnants of centuries of human use and occupation on and below the ground surface.~~

Cultural Resources Investigation

The LGRP corridor from I-880 to the UPRR bridge in Alviso contains several known archaeological sites and several important historic sites. Definitions of archaeological site boundaries are difficult to establish in the lower Guadalupe River area because substantial buried cultural deposits may be represented on the surface only as small patches or, in some cases, may not be represented at all. Several of the known sites were tested during previous studies to determine site boundaries; however, testing was conducted only to assess specific impacts of previously proposed projects, resulting in a fragmentary and dispersed knowledge of these sites. For this reason, no definitive map of vertical and horizontal site boundaries has been produced for this area (URS Greiner Woodward Clyde 1998). Many of these sites are immediately adjacent to the river; portions of the sites may be buried under the levees and could extend into the existing river channel.

Eleven known sites adjacent to or near the river have been recorded and verified through field research; these sites are described below. ~~Two previously recorded sites (CA-SCL-311H and CA-SCL-5), whose locations or existence were not confirmed in the field, were identified as sensitive. In addition, site CA-SCL-810 is mentioned; however, it was found to be ineligible for listing on the NRHP.~~ The information presented was derived and summarized from ~~a~~ reports prepared for the District by URS Greiner Woodward Clyde (1998, 2002), which present the results of their background research, consultation, and field surveys. ~~The following information on known cultural resources is presented by appropriate LGRP reach.~~ The following sections present the current information on sites within the project area within each appropriate LGRP reach. In addition to site type and location, the significance of sites is also stated where such information is known or can be predicted. Significant resources under CEQA are generally defined as those that meet the eligiblity requirements of the California Register of Historical Resources (CRHR). Sites that are listed on or meet the eligiblity requirements of the National Register of Historic Places (NRHP) are considered eligible for the CRHR.

Reach A

~~An archival search was performed at the Northwest Information Center for reach A.~~ No cultural resources were identified in this area.

Reach B

Site CA-SCL-762 (the alpha-numerical designation, such as *CA-SCL-762,* is ~~the formal~~ referred to as the *trinomal* ~~designated~~ by the State Office of Historic Preservation ~~that~~ and indicates that ~~the~~ a given site has been formally recorded ~~as cultural resource site 762~~) is located near the Trimble Road bridge crossing of the lower Guadalupe River. This site is a shell midden visible on both the east and west banks of the river. The site is approximately 152.4 m (500 feet) wide, extending across the river; it extends along the river for approximately 243.84 m (800 feet). The shell midden may be a secondary deposit used to construct the levee ~~(URS Greiner Woodward Clyde 1998)~~. There is a possibility that an intact buried deposit exists at this site.

Site CA-SCL-311H was originally recorded in 1910 as a historic road. No traces of this site have been discovered since that time. The site is thought to be either buried or destroyed. No other information is available.

Reach C

Site CA-SCL-492 is located on the west side of the lower Guadalupe River, approximately 286 m (938 feet) south of Montague Expressway. The site is a 20-by-50-m (approximately 66-by-164-foot) scatter of prehistoric artifacts in and along the west levee. The artifacts appear to represent a secondary deposit, but there is a possibility that a buried site exists in the area ~~(URS Greiner Woodward Clyde 1998)~~. No subsurface testing has been undertaken in this area. This site has not been thoroughly evaluated; therefore, its ~~NRHP~~ CRHR status is unknown. The area should be considered sensitive for buried cultural deposits. Site CA-SCL-762, identified above for reach B, also extends into reach C.

Reach D

Site CA-SCL-276 is located on the east side of the lower Guadalupe River, approximately 286 m (938 feet) north of Montague Expressway. The site is a prehistoric midden that extends along the east side of the river for approximately 238 m (781 feet). The cultural layer is located under

30–50 cm (approximately 11.7–19.5 inches) of sterile soil and is about 120 cm (46.8 inches) thick. The site includes a variety of prehistoric artifacts and features, as well as human bone fragments and 1 known human burial. Formal evaluation ~~will~~ would most likely determine that the site is eligible for listing on the CRHR ~~NRHP under criterion D~~ (URS Greiner Woodward Clyde 1998).

Site CA-SCL-6W is a large prehistoric site along approximately 838 m (2,750 feet) of the west side of the river from approximately 122 m (400 feet) south of the Hetch Hetchy Aqueduct to about 61 m (200 feet) south of the Tasman Drive river crossing. The site spans both reaches D and E. It includes a variety of prehistoric artifacts and 140 known human burials. Excavations at the site indicate that cultural materials exist to depths of 1 m (3.28 feet). The site has not been formally evaluated; however, formal evaluation ~~will~~ would most likely determine that the site is eligible for listing on the CRHR ~~NRHP under criterion D and possibly criterion B~~ and is certain to be of concern to contemporary Native Americans ~~(URS Greiner Woodward Clyde 1998)~~.

Site CA-SCL-359 is located on the east side and adjacent to the river, approximately 122 m (400 feet) north of Montague Expressway. The site is a 40-by-40-m (131.2-by-131.2-foot) cultural deposit containing burnt earth, charcoal, and bone. Excavations revealed a 1-m (3.28-foot)-thick deposit buried under 160 cm (62.4 inches) of sterile soil. This site is potentially eligible for listing on the CRHR ~~NRHP~~.

Site CA-SCL-7/H is located in a bend on the west side of the river, approximately 380 m (1,250 feet) north of Montague Expressway. The area extends approximately 238 m (781 feet) along the river and includes both a prehistoric midden and the historic Lick Mill site. The midden includes a variety of prehistoric artifacts, as well as human bone fragments; it is approximately 2 m (6.56 feet) thick in some areas. Historic artifacts have been identified to depths of about 1 m (3.28 feet). The Lick Mill site is listed on the NRHP. Although the integrity of setting of the Lick Mill site has been degraded as a result of modern development, the archaeological components of both the Lick Mill and prehistoric sites may still be intact. The prehistoric component of this site has not yet been formally evaluated for eligibility for listing on the NRHP; however, information from previous records indicates that the prehistoric site would most likely qualify for inclusion on the NRHP and ~~California Register of Historic Resources~~ CRHR, based on the potential to yield important information ~~(URS Greiner Woodward Clyde 1998)~~.

Site CA-SCL-553 is located approximately 380 m (1,250 feet) south of the Hetch Hetchy Aqueduct on the east side of the river, approximately 96 m (313 feet) east of the levee. The cultural layer is buried under about 1 m (3.28 feet) of sterile soil and is approximately 1 m (3.28 feet) thick. Although the recorded site is outside the project's Area of Potential Effect (APE), the southern boundary of the site has not been defined and may~~, in fact,~~ extend into the APE. This site has not yet been formally evaluated for eligibility for listing on the NRHP or the CRHR.

Site CA-SCL-559 is a 10-by-20-m (32.8-by-65.6-foot) prehistoric midden deposit located on the east side of the river, approximately 286 m (938 feet) south of the Hetch Hetchy Aqueduct and just a few meters east of the levee. Excavations indicate that cultural material at this site is buried under 1 m (3.28 feet) of sterile soil and the cultural layer is approximately 40 cm (15.6 inches) thick. The site has been subsequently covered with compacted fill and was paved over for use as a parking lot; it could be avoided. The site has not been formally evaluated, therefore, its NRHP or CRHR status is not known.

Reach E

With the exception of site CA-SCL-6W, which is discussed under reach D above, no sites in subreach E have been identified. There has not been a formal evaluation on the Hetch Hetchy Aqueduct or for the supporting trestle; therefore, ~~the~~ their eligibility ~~of~~ for listing on the NRHP or the CRHR has not yet been determined.

Reach F

Site CA-SCL-6E/447 is located on the east side of the river, extending approximately 191 m (625 feet) north from just south of Tasman Drive. The site includes a variety of prehistoric artifacts and 2 known human burials. Excavations indicate that cultural materials exist to 140 cm (54.6 inches) below the surface and, in some areas, are buried by 50 cm (19.5 inches) of sterile soil. The site has been determined eligible for the NRHP (URS Greiner Woodward Clyde 1998).

Site CA-SCL-268 is located at the levee margin on the east side of the river, approximately 572 m (1,875 feet) north of the Tasman Drive crossing, and extends along the levee for approximately 95.3 m (313 feet). The site is prehistoric midden that includes shell, baked clay, and 16 known human burials. Excavations at the site in 1981 indicated that cultural materials exist from the surface to 170 cm (66.3 inches) below the surface. After these excavations, the site was covered with approximately 3 m (9.84 feet) of sterile soil and a pump station was constructed over a portion of the site. Although the site has not been formally evaluated, the presence of human remains indicates that it would be eligible for listing on the NRHP and the CRHR and would be of concern to contemporary Native Americans.

Site CA-SCL-5 is shell midden believed to be on the west bank in reach F. It was originally recorded in the early 1900s and never subsequently recorded archaeologically. It is believed to be under the landfill on the west bank, but it is possible that it was destroyed during the channelization of the river in the 1960s. There is no precise location for this site or any detailed information.

Reach G

Site CA-SCL-339-H, the ~~Town~~ Port of Alviso Historic District, is listed on the NRHP. It is located on the east side of the river and extends along the river for approximately 762 m (2,500 feet). Although the historic district is on the NRHP, its integrity and character-defining elements as a whole have not been clearly stated. For the purposes of this project, therefore, any impact on the structures or ground disturbance within the Historic District is considered a significant impact that should be mitigated to a less-than-significant level. ~~contributing versus noncontributing elements have not been addressed. These issues will need to be addressed before potential impacts on the historic district can be assessed.~~ Specific structures that have the potential to be affected by the Proposed Project include the Bayside Canning Company building complex, the South Bay Yacht Club, Wade's Warehouse, and the Old Union warehouse and docks. In addition to physical impairment of contributing buildings or structures, visual intrusions on the historic district have the potential to cause significant impacts.

Site CA-SCL-810H is located at Alviso Slough, approximately 914.4 m (3,000 feet) north of SR 237. The site is a World War II shipyard; it is not eligible for listing on the NRHP and therefore need not be considered further.

The addendum report identified several properties that have the potential to be eligible for the NRHP, but have not been fully documented or evaluated. The UPRR bridge may be a historic property and a formal evaluation would need to be done to determine eligibility for listing on the NRHP. Cargill Pond A8W was originally constructed as a harvesting pond by the Alviso Salt Company sometime between 1923 and 1929, and was later used as a concentrating pond. Other salt ponds in the region have been found eligible for listing in the CRHR, indicating that this is a potentially eligible resource type. The pond could also be considered part of a larger archaeological site, along with the remains or deposits representing the original Alviso Salt Company development. Bayside Cannery has been identified in several surveys as a potentially significant resource for its association with the Alviso Historic District and for its association with trends in the ethnic history of the region. Sites associated with Bayside Cannery include the remains of structures and buildings and possibly archeological deposits associated with the company town that surrounded the plant.

~~Native American~~ Consultation

~~No federal lands are involved in this project.~~ All Native American consultation ~~is therefore~~ was undertaken for this project under the purview of Section 106 of the NHPA, which calls for public involvement in the decision-making process for addressing historic properties and, with respect to consultation procedures, the procedures of the Native American Heritage Commission (NAHC). This consultation was also undertaken to meet the requirements of public involvement for CEQA. Additional consultation was conducted with members of the public that have historical interests in the area, such as local Hispanic and Chinese communities.

The NAHC maintains a file of locations in the state identified as Sacred Lands (i.e., lands identified as representing spiritual values for local Native Americans), as well as a list of Native American contacts and Most Likely Descendants (MLD) of local Native American groups. Discovery of human remains is common in Santa Clara County projects. Human remains are known to be present in most of the known sites along the lower Guadalupe River; therefore, it is important to identify appropriate Native American contacts early in the development of the LGRP. The Native American contact list comprises individuals or groups who should be consulted, in compliance with Pub. Res. Code 5097, when Native American human remains are uncovered either during archaeological excavations or in conjunction with development. Under Pub. Res. Code 5097, the MLD must be afforded the opportunity to make recommendations for the treatment and disposition of the human remains. For the San Francisco Bay region, it is the policy of the NAHC to rotate MLD responsibility among all identified descendant groups and individuals.

The NAHC was contacted before the field reconnaissance and reported that there are no Sacred Lands identified within the project area. The NAHC also provided a list of Native American contacts. URS Greiner Woodward Clyde (1998) sent letters to those on the list, discussing the LGRP and treatment of cultural resources. Additional consultation will be carried out ~~with~~ through the development and implementation of the programmatic agreement (PA). The Corps archaeologist has invited the interested Native Americans to be a concurring party on the PA. ~~A Native American monitor was present during exploratory geotechnical excavations in areas of sensitivity.~~

Programmatic Agreement

The Corps is in the process of formulating the PA for compliance with Section 106 of the NHPA to address the adverse effects of the undertaking on historic properties. The PA will include provisions to address potential impacts on historic and potentially historic resources that could be affected by the adopted alternative.

The PA will include 4 basic elements:

- an archaeological and Native American monitoring plan for the project as a whole;
- an inadvertent-discovery plan to address discoveries of cultural resources made during construction;
- provisions for developing, before construction, detailed historic and prehistoric contexts for assessing the significance of resources; and
- preconstruction assessment plans for accessible locations where impacts might be anticipated.

The last element will include provisions for evaluating the integrity of CA-SCL-6W at the Hetch Hetchy Aqueduct; assessing and documenting the Hetch Hetchy Aqueduct itself (if the Channel Bank Modification Alternative is adopted); evaluating potential impacts on structures in Alviso that could be affected by the Baylands Mitigation Measure; and testing to determine whether buried resources are present in the area that would be affected by the SR 237 levee bypass, if this becomes a project alternative. Additional measures would need to be adopted if the Baylands Mitigation Measure becomes part of the project.

The cultural resources PA will stipulate that if significant resources are discovered in areas as the result of these assessments, appropriate site-specific mitigation plans (which would be expected to include data recovery) would be developed and carried out. It should be noted that avoidance of impacts on significant resources is the preferred mitigation measure. Significant resources would be avoided wherever possible.

Impact evaluations in this section are based on data reported in a an initial records review (URS Greiner Woodward Clyde 1998) and addendum (URS Corp 2001) prepared on behalf of the District.

Methods and Significance Criteria

The following evaluation of impacts on cultural resources is based on a review of existing literature, a records search at the Northwest Information Center at Sonoma State University, consultation with the NAHC, interested Native Americans, and the Corps' archaeologist. A field reconnaissance survey of the LGRP APE, as defined in 1998, was conducted by qualified archaeologists from URS Greiner Woodward Clyde. Sites were also monitored during geotechnical testing for the possibility of identifying subsurface cultural deposits. During a second round of archival research, previous archaeological investigators familiar with the project area were consulted, as were additional unpublished documents, not yet available at the Northwest Information Center. The field reconnaissance was updated in 2002 to include the baylands mitigation project area (URS 2002).

According to CEQA, a project with an effect that may cause a substantial adverse change in the significance of a historical resource is a project that may have a significant effect on the environment (CEQA rev. 1998 Section 15064.5[b]). CEQA further states that a substantial adverse change in the significance of a resource means the physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of an historical resource would be materially impaired. Actions that would materially impair the significance of a historical resource are any actions that would demolish or adversely alter those physical characteristics of an historical resource that convey its historical significance and qualify it for inclusion in the CRHR or in a local register or survey that meets the requirements of sections 5020.1(k) and 5024.1(g) of the Public Resources Code. ~~an impact is considered significant if it would adversely affect a prehistoric or historic archaeological site or a property of historic or cultural significance to a community or ethnic or social group~~.

The 2000 CEQA Guidelines (sec. 15064.5) define 4 cases in which a property can qualify as a significant historic resource for the purposes of CEQA review:

- The resource is listed in or determined eligible for the listing in the CRHR.
- The resource is included in a local register of historic resources, as defined in sec. 5020.1(k) of the Public Resources Code, or is identified as significant in a historical resources survey that meets the requirements of section 5024.1(g) of the Public Resources Code (unless the preponderance of evidence demonstrates that the resource is not historically or culturally significant).
- The lead agency determines the resource to be significant as supported by substantial evidence in light of the whole record.
- The lead agency determines that the resource may be a historical resource as defined in Public Resources Code sec. 5020.1(j) or 5024.1.

A resource may be eligible for inclusion in the CRHR if it

- is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
- is associated with the lives of persons important in our past;
- embodies the distinctive characteristics of a type, period, region, or method of construction, represents the work of an important creative individual, or possesses high artistic values; or
- has yielded, or may be likely to yield, information important in prehistory or history.

Properties that are listed in or eligible for listing in the NRHP are considered eligible for listing in the CRHR and thus are significant historical resources for the purpose of CEQA (Public Resources Code section 5024.1[d][1]).

~~Section 106 of the NHPA prescribes specific criteria for determining whether a project would adversely affect a historic property, as defined in 36 CFR 800.5. An impact is considered significant when prehistoric or historic archaeological sites, structures, or objects listed in or eligible for listing in the NRHP are subjected to the following effects:~~

- ~~physical destruction of or damage to all or part of the property;~~
- ~~alteration of a property;~~
- ~~removal of the property from its historic location;~~
- ~~change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance;~~

- ~~introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features;~~
- ~~neglect of a property that causes its deterioration; and~~
- ~~transfer, lease, or sale of the property.~~

~~Cultural resources significance is evaluated in terms of eligibility for listing in the NRHP. NRHP significance criteria applied to evaluate the cultural resources in this study are defined in 36.CFR 60.4 as follows:~~

> ~~The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, association, and~~
>
> ☐ ~~that are associated with events that have made a significant contribution to the broad patterns of our history; or~~
>
> ☐ ~~that are associated with the lives of persons significant in our past; or~~
>
> ☐ ~~that embody the distinctive characteristics of type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or~~
>
> ☐ ~~that have yielded, or may be likely to yield, information important in prehistory or history.~~

The impact analysis below assumes a 17,000 cfs floodflow. Potential impacts associated with the additional 1,350 cfs of interior drainage entering the Guadalupe River are addressed in chapter 4, "Cumulative Impacts."

Alternative 1: No Project

Impact: Potential Disturbance of Historic Properties

Under the No-Project Alternative, current management and maintenance operations of levees and channel overbank areas in reaches A–G would continue as currently implemented by the District. No new impacts on known or undiscovered archaeological or historic resources would result from this continued activity because the existing levees are composed of material that was imported or is highly disturbed and therefore has little or no archaeological significance. In addition, recently deposited sediments are not archaeologically significant. It is possible that there are undiscovered archaeological remains in the streambanks, but routine maintenance activities under the No-Project Alternative would not affect these potential sites because vegetation management is not conducted in areas near the low-flow channel of the lower Guadalupe River. There are no historic resources in the river channel that could be affected under the No-Project Alternative. This impact is considered less than significant. No mitigation is required.

Alternative 2: Floodwalls/Levee Raise (Proposed Project)

Impact: Potential Disturbance of Previously Recorded Archaeological Deposits in Reaches B and C

Under the Proposed Project, potential excavation, drilling, or pile driving for retaining-wall-foundation construction on the west outboard levee bank in reaches B and C has the potential to result in impacts on archaeological sites SCL-762 and SCL-492. Both of these sites, as presently recorded, are potentially secondary deposits of previously excavated material; however, intact deposits may be buried under the banks at these locations. If these deposits are intact, they could be archaeologically significant and could be damaged by construction activities. This potential impact is considered significant. To reduce this impact to a less-than-significant level, the District ~~would~~ will implement the following mitigation measure.

Mitigation Measure CR-1: Monitor all Excavation

Archaeological and Native American monitoring plans will be set forth in detail in the cultural resources PA for the project. The District will require that an archaeological monitor be present during the excavation on the west bank at the locations of SCL-762 and SCL-492 if backwalls are required at these locations. If excavation reveals archaeological material below the level of the levee base, project work in the vicinity will stop to provide the archaeologist an opportunity to inspect the materials and assess their integrity. If the deposits retain integrity, they will be assumed to be significant under NRHP/CRHR criterion D (potential to yield data), and a data recovery/mitigation plan will be developed in accordance with the terms of the cultural resources PA.

If human remains are uncovered during excavation or soils disturbance, work in the vicinity will stop, the remains will be protected, and the provisions of state law with respect to the county coroner (Pub. Res. Code sec. 5097.98) and Native American consultation will be applied. If the remains cannot be positively identified as human at the time of discovery, they will be left in place in the ground until they can be inspected by an archaeologist or other person qualified to identify human bone.

An archaeological monitor will be present during drilling for foundation construction if this activity will bring subsurface soils to the surface. If archaeological materials are evident in the drill spoils, drilling in the vicinity will be halted until additional assessment and mitigation can be established, consistent with the terms of the cultural resources PA. Pile driving typically does not bring subsurface material to the surface; therefore, archaeological monitoring will not be required for pile driving, even at sensitive locations. However, if a pile cap is excavated at the identified site location, this excavation will be monitored by an archaeologist, with work stoppage and mitigation provisions as described above.

These mitigation measures would reduce impacts of the Proposed Project to a less-than-significant level because previously recorded sites would be protected and work would stop if human remains are found at excavation sites.

Impact: Potential Disturbance of Undiscovered Cultural Resources in Reaches A–C

Under the Proposed Project, potential excavation, drilling, or pile driving for retaining wall foundation construction could affect buried historic structures and undiscovered archaeological resources on both sides of reaches A–C. Several historic structures ~~appear~~ are referenced in the archival record on both sides of the river in these areas:

- The site of the first Santa Clara Mission (1777–1779) on the east bank in reach B.
- The M. Dawson building (1876) on both banks in reach B.
- "Old Spanish Bridge" (late 18th and early 19th century) on the east bank in reach B. This is probably the same as CA-SCL-311H, which was previously recorded as a historic road that was supposed to have crossed the bridge at this point. No traces of the site of CA-SCL-311H have been found.
- A historic house site (1866) on the west bank of reach B.
- The J.L. Burtis House and Farm (1857) on the west bank in reach C.
- W.W. Montague's Riverside Farm (1899) on the west bank in reach C.

- The Charles Wade ranch (early phase) (1860s) on the west bank in reach C.

In addition, the entire lower Guadalupe River is sensitive for the presence of buried prehistoric archaeological resources. Activities that result in disturbances to native soils have the potential to result in impacts on undiscovered archaeological resources. The potential for impacts on undiscovered archeological resources is considered significant because of the high sensitivity for the presence of cultural resources in these reaches of the river. To reduce these potential impacts to a less-than-significant level, the District ~~would~~ will implement the following mitigation measure.

Mitigation Measure CR-1: Monitor All Excavation

This mitigation measure is described in detail above. No further mitigation is required.

Impact: Potential Disturbance of Previously Recorded Archaeological Deposits and Historic Architectural Features in Reaches D–G

Under the Proposed Project, potential excavation, drilling, or pile driving for retaining-wall-foundation construction could be required on the east and west outboard levee banks in reaches D–G in areas where floodwalls or levee raising is required. No known sites in reach F would ~~not~~ be affected by bridge transition floodwalls upstream of SR 237 because no sites have been found in ~~this~~ the area of construction ~~location~~. This construction activity has the potential to result in impacts on archaeological sites CA-SCL-276, CA-SCL-6W, CA-SCL-359, CA-SCL-7/H, CA-SCL-553, and CA-SCL-559 in reaches D and E. These potential impacts are considered significant because of the potential significance ~~sensitivity~~ of these recorded sites. To reduce these impacts to a less-than-significant level, the District will implement Mitigation Measure CR-1.

In reach G, the east bank construction zone would be adjacent to the Alviso National Register Historic District (CA-SCL-339H). If pile driving is used for floodwall or backwall construction in this reach, a potential exists for indirect vibrational effects on the Wade's Warehouse property, which is an element of ~~the Historic District~~ CA-SCL-339H. Wade's Warehouse is located adjacent to this reach at 1657 El Dorado St., but is separated from the levee by an intervening street. Indirect vibrational effects on this historic structure could include adverse effects on the structure or foundation from ground shaking associated with pile driving. This impact is considered significant. To reduce these impacts to a less-than-significant level, the District will implement Mitigation Measure CR-2.

Construction of floodwalls in reach G would not result in a significant direct or indirect (visual) impact on the setting of properties in the historic district because floodwall heights in areas adjacent to the historic district would be less than 0.31 m (1 foot) on the east bank levee. This ~~potential impact~~ is considered a less than significant impact because it constitutes a relatively minor change to an existing levee that would not substantially alter ~~change~~ the ~~historical context of a~~ historic district ~~element~~. No additional mitigation is required for this visual impact on the setting of the Alviso historic district.

Mitigation Measure CR-1: Monitor All Excavation

This mitigation measure is described in detail above. No further mitigation is required.

Mitigation Measure CR-2: Avoid Vibrational Impacts on the Alviso Historic District

The District will avoid potential vibration impacts on Port Alviso Historic District structures in the vicinity of reach G by prohibiting use of pile drivers for foundation construction on the reach-G levees.

Impact: Potential Effect of Construction Staging Areas on Previously Recorded Archaeological Deposits and Historic Architectural Features

Several potential sites for construction staging areas have been identified adjacent to the lower Guadalupe River (figure 2-7). Use of staging area 5 could disturb site CA-SCL-276. Use of staging area 10 could disturb site CA-SCL-6W. Because ~~surface~~ ground disturbance cannot be ruled out at these sites from storing equipment and heavy machinery, this potential impact is considered significant. It is assumed that no subsurface disturbance would be required at staging areas and there would be no effects on subsurface cultural resources. To reduce impacts on these 2 sites to a less-than-significant level, the District ~~would~~ will implement the following mitigation measure.

Mitigation Measure CR-3: Restrict Site Used for Staging Areas

The District will restrict use of staging areas 5 and 10 in areas where known cultural resources (sites CA-SCL-276 and CA-SCL-6W) are located, either by not using these sites as staging areas during LGRP construction or by using only portions of these sites that are outside the known boundaries for these resources. The District will require that cultural resources site boundaries be identified for the contractor before beginning construction.

Impact: Potential Disturbance of Undiscovered Cultural Resources in Reaches D–G

Under the Proposed Project, potential excavation, drilling, or pile driving for retaining-wall-foundation construction (on the back sides of levees) could affect buried historic structures and undiscovered archaeological resources in reaches D–G. This alternative also includes the proposed reconstruction of the SR 237 eastbound bridge (or construction of a SR 237 bypass channel option). These construction activities have the potential to result in impacts on undiscovered cultural resources, including archaeological deposits and historic features on both the east and west banks of the river, along the SR 237 bridge corridor, and at any locations proposed for ancillary construction or construction support.

The location of previously recorded and buried archaeological site CA-SCL-5 is somewhere in the vicinity of SR 237, but its precise location is not known. The potential for buried archaeological resources to be present in the affected area, which includes 2 meanders of the former river channel, is high. Historic features in the archival records north of SR 237 include the Old Embarcadero (late 18th century to 1840s) on the west bank, the Martin Bernal homesite (1830s and 1840s), and the Alviso Family adobes (1830s) on the east bank; an unknown building (1899) on the west bank; and the Guadalupe Berryessa Adobes (1830s) south of SR 237 on the east bank. It is also possible that potentially significant historic levees could be affected along the former river channel. Proposed Project grading, excavation, and construction on all quadrants of the SR 237 bridge crossing have high potential for archaeological impacts. These potential impacts on undiscovered cultural resources are considered significant because of the high sensitivity for archaeological resources in the LGRP area. To reduce these impacts to a less-than-significant level, the District ~~would~~ will implement ~~the following~~ mitigation measures CR-1 and CR-4.

Mitigation Measure CR-1: Monitor All Excavation

This mitigation measure is described in detail above. ~~The following additional mitigation measure for the SR 237 bridge reconstruction and associated laydowns would be implemented.~~

Mitigation Measure CR-4: Avoid Impacts on Sensitive Subsurface Archaeological Resources

The District will avoid impacts on sensitive subsurface archaeological resources, particularly near the SR 237 bridge construction area, by ensuring that no construction takes place in these sensitive areas before subsurface testing clearly indicates that no impacts on sensitive archaeological resources would result from project construction. The District will perform a cultural resources reconnaissance for the most sensitive resource areas to develop a testing strategy. A mechanical archaeological testing program will be performed. The goal of testing will be to identify subsurface resources that could be affected by soil excavations below the invert of lower Guadalupe River levees. If resources are identified, additional hand or mechanical excavation will be performed to define resources boundaries, assess integrity, and evaluate significance. For historic resources, site-specific historic research ~~could~~ will also be required. If resources are identified that appear to be eligible for the NRHP or CRHR, treatment plans will be developed and implemented to recover, avoid, or document the resource. This testing program would be developed in coordination with the Corps, Caltrans, the SHPO, and the District and will be implemented in accordance with a cultural resources PA. If human remains are discovered, site work will stop immediately as indicated under Mitigation Measure CR-1.

Alternative 3: Channel Bank Modification

Impact: Potential Disturbance of Previously Recorded Archaeological Deposits and Historic Architectural Features in Reaches B–G

Under the Channel Bank Modification Alternative, potential excavation, drilling, or pile driving for retaining-wall-foundation construction (on the back side of the levees) at bridge approaches and in reaches D–G for the channel modification structures could result in disturbance to previously recorded archaeological and historic sites in a manner similar to that indicated for the Proposed Project. Construction activity could disturb 3 archaeological sites on the west bank:

- CA-SCL-7/H (reach B),
- CA-SCL-6W (reaches E and F), and
- CA-SCL-5 (reach F).

It could also disturb 6 archaeological sites on the east bank:

- CA-SCL-359 (reach D),
- CA-SCL-276 (reach D),
- CA-SCL-553 (reach D),
- CA-SCL-559 (reach D),
- CA-SCL-6E/447 (reaches E and F), and
- CA-SCL-268 (reach F).

Two archaeological sites occupy both the east and west banks of the river—CA-SCL-762 (reach B), and CA-SCL-311H (reach B). At each of these sites, there could be an intact deposit below the surface in the riverbanks. If a buried intact deposit were discovered within the APE at any of these locations, it would be assumed to be significant under NRHP/CRHR criterion D (potential to yield important data). Significant archaeological impacts could result from disturbance or removal of a deposit as the result of project excavation. Further, there is a potential for impacts on human remains by any disturbance of prehistoric archaeological deposits. Pile driving may also result in indirect impacts on structures in the NRHP-listed Alviso Historic District, SCL-339H, in the same manner as that described for the Proposed Project. These potential impacts are considered significant. To reduce these potential impacts to a less-than-significant level, the District would implement the following mitigation measure.

Mitigation Measure CR-1: Monitor All Excavation

This mitigation measure is described in detail above under the Proposed Project.

Mitigation Measure CR-2: Avoid Vibrational Impacts on Alviso Historic District

This mitigation measure is described in detail above under the Proposed Project.

Impact: Potential Disturbance of Previously Recorded Archaeological Deposits and Historic Architectural Features at the Hetch Hetchy Aqueduct Crossing

Under the Channel Bank Modification Alternative, the potential need to relocate Hetch Hetchy pipelines could result in significant impacts on a large prehistoric site, CA-SCL-6W. The aqueduct may lie in the site's margin. Excavation of a deep trench in the margin of the site could destroy archaeological deposits if intact materials are present. In addition, the aqueduct itself is a feature of a historically important water-conveyance system that may be eligible for listing in the NRHP. If the pipeline is eligible for the NRHP or the CRHR, alteration of its material or location, or removal of features such as the aqueduct trestle, would constitute a significant impact. To reduce this impact to a less-than-significant level, the District would implement the following mitigation measure.

Mitigation Measure CR-5: Perform Preconstruction Archaeological Test Excavation

To mitigate the potential effects of the relocation of the Hetch Hetchy Aqueduct, preconstruction archaeological test excavation will be performed on the west bank in the southern end of CA-SCL-6W, adjacent to both sides of the aqueduct, to determine whether the site extends into the area that would be affected by the relocation. Testing will include excavation of at least 1 controlled excavation unit at either side of the aqueduct to determine whether intact deposits are present, and deep augering could be required along the aqueduct for the length of the affected area to determine the depth of deposit and whether buried deposits are present. If intact materials are present, an assessment will be made in consultation with the SHPO as to whether additional data recovery is warranted, and data recovery will be carried out as appropriate. If a temporary bypass would be placed on the site during relocation work, the bypass location will be subject to similar mitigation measures. Details of this mitigation are presented in the cultural resources PA.

Documentation of the history, physical appearance, and engineering characteristics of the segment of the Hetch Hetchy Aqueduct that is to be relocated (including the river crossing) could reduce impacts on this segment to a less-than-significant level. If channel modification requires that the aqueduct be modified, it would be subject to an assessment by an architectural historian. If it appears to be eligible for listing on the NRHP, and the qualities that make it eligible would be affected by the project, appropriate mitigation to avoid impacts will be developed consistent with the terms of the cultural resources PA. Mitigation could include project design, historic research, and/or recordation to Historic American Engineering Record (HAER) standards.

Impact: Potential Effect of Construction Staging Areas on Previously Recorded Archaeological Deposits and Historic Architectural Features

Several potential sites for construction staging areas have been identified in areas adjacent to the lower Guadalupe River (figure 2-7). Use of staging area 5 could disturb site CA-SCL-276. Use of staging area 10 could disturb site CA-SCL-6W. Because surface disturbance cannot be ruled out at these sites from storing equipment and heavy machinery, this potential impact is considered significant. It is assumed that no subsurface disturbance would be required at staging areas and there would be no effects on subsurface cultural resources. To reduce impacts on these 2 sites to a less-than-significant level, the District would implement the following mitigation measure.

Mitigation Measure CR-3: Restrict Site Used for Staging Areas

This mitigation measure is described in detail above under the Proposed Project. No further mitigation is required.

Impact: Potential Disturbance of Undiscovered Cultural Resources

Under the Channel Bank Modification Alternative, potential excavation, drilling, or pile driving for retaining-wall-foundation construction (on the back sides of levees) and associated with the channel modification structures could affect buried historic structures and undiscovered archaeological resources in reaches B–G. Archival research has identified potential historic features or sites that have not been archaeologically recorded at several locations along the river. These sites are the same as those identified for the Proposed Project. Because the depositional history of the lower Guadalupe River indicates that there is a high potential for undiscovered archaeological resources and historic features in the LGRP area, the potential impacts under this alternative are considered significant. To reduce these impacts to a less-than-significant level, the District would implement the following mitigation measure.

Mitigation Measure CR-1: Monitor All Excavation

This mitigation is the same as identified for the Proposed Project, except that mitigation of activities associated with replacing the SR 237 bridge would not be required because the Channel Bank Modification Alternative would not require bridge construction. An archaeological monitor will be present during any excavation that may extend beyond the footprint of the existing levee, below the base of the levee, into native soils. Archaeological and Native American monitoring plans to address potential impacts on undiscovered archaeological resources and historic features are described in detail in the cultural resources PA.

Alternative 4: Channel Bypass

Under the Channel Bypass Alternative, excavation required to site bypass culverts in existing lower Guadalupe River levees would substantially increase the potential for impacts on recorded and unrecorded archaeological and historic sites in reaches B–G compared to the Proposed Project. Siting bypass culverts would require excavation of native material under the west-bank levees from U.S. 101 to the UPRR bridge and under east-bank levees from Montague Expressway to the UPRR bridge. Under this alternative, all the recorded sites in these reaches would most likely be significantly affected by construction activities, and all the mitigation measures identified for the Proposed Project would need to be implemented for a larger number of recorded and unrecorded sites. Sites CA-SCL-762, -311H, -492, -276, -6W, -359, -7/H, -553, -559, -6E/447, -268, -5, and -339-H (Alviso Historic District), as well as unknown sites throughout reaches A–G, could potentially be affected under this alternative.

Implementing the Channel Bypass Alternative would also require relocating the Hetch Hetchy pipelines in a manner similar to that discussed for the Channel Bank Modification Alternative. This impact on a potentially significant resource would not occur under the Proposed Project.

Initial and routine vegetation and sediment management activities under this alternative would not affect buried resources because recently deposited sediment is not archaeologically significant and there would be no vegetation management within the 4.6- to 6.1-m (15- to 20-foot)-wide vegetated buffer area in the low-flow channel.

Baylands Mitigation Measure

Under the recommended Baylands Mitigation Measure as detailed in the "Hydrologic and Hydraulic Conditions" section of this chapter, a potential exists for impacts on previously recorded and undiscovered cultural resources. A portion of the baylands mitigation area was addressed in historic research and a previous archaeological survey that was completed along the river downstream to the Alviso Marina (URS Greiner Woodward Clyde 1998). No records search, survey, or archival research has been completed for the remainder of the area (land above water out to the bay margin), and resources have not been evaluated for NRHP significance.

An addendum to that report included additional descriptive documentation of the contributing buildings within the Alviso Historic District, and applied the NHPA criteria for adverse effect to determine whether the Baylands Mitigation Measure would have an adverse effect on the Alviso Historic District. The finding of effect concluded that construction of the overflow weir and construction activities to improve the levee have the potential to cause adverse effects associated with construction-period vibration impacts, dust accumulation on building facades, increased noise and vibration from construction equipment, and restrictions or changes in circulation and access. Mitigation measures were identified that would avoid those impacts and allow a finding of no adverse effect.

Impact: Potential Disturbance of Previously Recorded Cultural Resources

There are at least 2 previously recorded sites within the baylands portion of the project. CA-SCL-339H, the Alviso Historic District, located on the east side of the river in the town of Alviso, is listed on the NRHP. Several of the historic structures associated with the property are in close proximity to the existing levees and could suffer ~~direct~~ impacts as a result of construction-period activities associated with excavation or construction~~ on the inboard side~~ of the overflow weir on ~~of~~ the levee~~, or expansion of the levee footprint~~. These potential impacts include vibration impacts on nearby un-reinforced masonry buildings. Incorporation of mitigation measure CR-2, prohibiting use of pile drivers for foundation construction on the reach G levees, would reduce these potential impacts to a level of less-than-significant.

The impacts associated with improvements to the small levee from UPRR to Alviso Marina also have the potential to result in visual impacts on the

Alviso Historic District from a raise in levee height or floodwall construction, as well as physical impacts from vibration and noise impacts from pile driving if this is required ~~for foundation~~ during construction. ~~Avoidance is the preferred measure to reduce potential effects from the Baylands Mitigation Measure on the Alviso Historic District.~~ Because this levee would not be raised substantially (i.e., less than 0.31 m [1 foot]) along the Alviso perimeter in the vicinity of standing historic structures, the setting of the district would not be impaired, and thus a significant impact on the historic district is not expected. Incorporation of mitigation measure CR-2, prohibiting use of pile drivers for foundation construction on the reach G levees, would reduce these potential impacts to a level of less than significant.

Site CA-SCL-810H, the site of a former shipyard, is located on the west side of the river a short distance below the UPRR bridge. This site has not been formally evaluated. The Baylands Mitigation Measure would not result in effects on this site because no physical elements of the Baylands Mitigation Measure are located near this site.

Impact: Potential Disturbance of Unrecorded or Undiscovered Archaeological Sites or Historic Features

Mitigation measures required in the baylands have the potential to result in significant impacts if they would disturb or destroy unrecorded historic features, or if they would result in disturbances to native soil adjacent to or beneath the levees, where undiscovered or unrecorded historic or prehistoric archaeological deposits could be present. There are several suspected historic resources in the baylands mitigation area. Primary among these is the Cargill salt pond property, a historic industrial site. A similar site elsewhere on the bay recently was determined eligible for listing in the NRHP as a rural historic landscape under criterion A (association with significant events). The site is located adjacent to Alviso Slough.

The Baylands Mitigation Measure would entail construction of an overflow weir in the Pond A8W levee and hardening of Pond A6 and could result in an increase in the depth of flooding of these ponds. ~~Assuming that Cargill Salt Pond A8W is determined to be eligible for listing in the NRHP as a rural historic landscape, the potential that constructing the inlet weir in the Pond A8W levee would alter this resources is considered a significant impact.~~ Cargill Salt Pond A8W would not be directly or indirectly affected. The Pond A8W levee where the overflow weir is to be constructed is not a historic property, and construction of this weir would not result in a significant impact to cultural resources. The Pond A6 levee is not a historic property either, and hardening this levee would not result in a significant impact. There would be no direct impacts on other Cargill salt pond levees because no other Bayland Mitigation Measure elements would physically alter ~~affect~~ Cargill levees and the ponds are known to flood infrequently under existing conditions. ~~To reduce this impact to a less-than-significant level, the Pond A8W levee in the vicinity of the inlet weir location would be recorded and evaluated by a historian and the mitigation conditions identified below would be implemented before construction of the weir structure. If this portion of the Pond A8W levee retains its historic integrity, it could be eligible for listing in the NRHP under criterion A (for association with important historic events) or criterion C (as significant examples of early levee engineering).~~

Archival research has identified several historic sites, remains of which could be present on the west side of the current channel in the baylands mitigation area:

- Captain R.K. Hamm Warehouse (1859),
- J.J. Ortley Warehouse (1860),
- the Agricultural Lime and Compost Company (1920s–1960s),
- the Baylands Cannery and company town (1920s-60s), and
- Leslie Salt Pond Operations (1931).

Archaeological surveys along the riverbank in this area did not reveal evidence of these historic features in the form of archaeological remains, deposits, or foundations; however, it is possible that there are buried materials associated with these historic sites in areas where excavation could be required, such as the inlet weir. The conditions provided below allow for additional work to determine the sensitivity of the construction area and to plan for data recovery in the event that deposits are encountered during construction. These conditions would reduce the potential impact to a less-than-significant level.

Baylands Mitigation Measure Conditions. Before the development of final engineering for the Baylands Mitigation Measure, detailed archival research, an archaeological records search, and archaeological survey would be carried out for the new ~~levee and~~ overflow weir site. Any potentially historic sites, structures, or features identified would be subject to full recordation and evaluation for eligibility to the NRHP. Appropriate mitigation measures would be developed and carried out in consultation with the Corps and the SHPO for any historic properties that would be adversely affected by the project, consistent with the stipulations of the cultural resources PA.

If bayland mitigation activity would alter the configuration of existing levees or other potentially historic features associated with the Cargill salt ponds, this activity would be preceded by recordation and assessment of the Cargill salt pond complex. If the complex is determined eligible for listing in ~~to~~ the NRHP, mitigation would include measures such as HAER recordation, video documentation, oral history, and/or archival research. A mitigation plan would be developed in consultation with the Corps and SHPO, consistent with the terms of the cultural resources PA.

~~Constructing a small levee between the UPRR and Alviso Marina has the potential to alter the configuration of historic levees or other potentially historic features adjacent to the site. Before construction occurs, the existing levee would need to be recorded and evaluated for historical significance. Assuming the existing levee is eligible to be listed, reconstruction could potentially diminish those qualities for which the property is eligible for the NRHP and could result in a significant impact. Mitigation conditions to reduce this impact, include HAER recordation and archival research of the site.~~

Baylands mitigation measures with the potential to disturb native soils, such as foundation work to the inlet weir, would be monitored by an archaeologist in the vicinity of potential historic sites, identified through archival research. In addition, an archaeologist would periodically inspect excavations and spoils where native soil is being excavated for the presence of potential prehistoric archaeological deposits. If archaeological materials or historic features were exposed in excavation, work would stop (as indicated in Mitigation Measure CR-1); the resource would be evaluated, and the exposed archaeological materials or historic features would be treated as inadvertent discoveries. With mitigation conditions incorporated into the Baylands Mitigation Measure, significant impacts would be reduced to a less-than-significant level.

Resources Evaluated and Eliminated from Further Consideration

The following resources were evaluated and eliminated from further consideration:

- agricultural resources,
- geology and soils,
- mineral resources, and
- population and housing.

The reasons for not considering these resources in detail are described below.

Agricultural Resources

No land affected by the Proposed Project, Channel Bank Modification Alternative, or Channel Bypass Alternative is currently under agricultural use, nor is any zoned for agricultural use. Because implementation of the LGRP would not result in the conversion of farmland to nonagricultural use, agricultural resources were eliminated from detailed consideration.

Soils

Construction and operation of the LGRP would not result in the substantial loss of topsoil; therefore, no evaluation of soils was conducted. The effects of soil erosion on water quality are addressed in the "Water Quality" section of this chapter.

Mineral Resources

The site of the LGRP is not in an area designated by the State Mining and Geology Board as containing mineral deposits of regional significance, pursuant to the Surface Mining and Reclamation Act of 1975. Mineral resources were therefore eliminated from detailed consideration. The State of California's finding that the area does not contain mineral deposits of regional significance is consistent with the *City of San Jose 2020 General Plan* (City of San Jose 1994a).

Population and Housing

Residential housing or other development would not be affected by the LGRP because the Proposed Project, Channel Bank Modification Alternative, and Channel Bypass Alternative would be contained within the existing District and Caltrans ROWs. Effects on population growth and housing availability were therefore not evaluated in detail.

Chapter 4
Cumulative Impacts

Introduction

Under CEQA, the term *cumulative impacts* refers to 2 or more individual effects that, when considered together, are considerable or compound or increase other environmental impacts. A cumulative impact is the change in the environment that results when the impact of a proposed project or an alternative is added to the incremental impacts of past, present, and reasonably foreseeable future projects, regardless of the person or agency that undertakes such other projects. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (State CEQA Guidelines sec. 15355; 40 CFR 1508.7).

CEQA requires that cumulative impacts be considered when determining whether a project would significantly affect the environment. CEQA requires that lead agencies identify related projects through a list or projection approach, summarize effects of the related projects, reasonably analyze the cumulative impacts of the Proposed Project, and recommend mitigation measures for the significant cumulative impacts (CEQA Guidelines sec. 15130(b)). Under the list approach, the lead agency must identify all past, present, and probable future projects that could contribute to a significant impact. In lieu of the list approach, a lead agency may base the cumulative analysis on a summary of projections in an adopted general plan or related planning document. The District has determined that a project list approach is appropriate for analysis of cumulative impacts associated with the Proposed Project.

Projects Addressed in the Cumulative Impacts Analysis

Thirty projects in the Guadalupe River system have been approved, are under construction, or have been proposed by other public agencies in addition to the LGRP:

- Guadalupe River Park Project*,
- State Route 87 Freeway Upgrade Project from U.S. 101 to Julian Street*,
- State Route 85 Transportation Corridor Project*,
- San Jose International Airport Expansion Plan*,
- Automated People Mover at San Jose International Airport,
- San Jose International Airport Fuel Storage Facility,
- Santa Clara Valley Water District Fish Ladder Construction Program*,
- Guadalupe Creek Restoration Project*,
- Los Capitancillos Freshwater Wetland Mitigation Site Development Project*,
- Upper Guadalupe River Flood-Control Project*,
- Downtown Guadalupe River Flood Protection Project*,
- Stormwater Pump Installations*,
- New Green Island Bridge Project,
- Pump Stations Emergency Operations Plan, Local Drainage Pump Stations and Gravity Outfalls,
- Virginia Street Bank Stabilization Project*,
- Santa Clara Valley Water District SMP*,
- Ulistac Natural Area,
- Nelo-Victor Pump Station Upgrade Project,
- Alviso Ring Levee Wetland Mitigation and Restoration Project*,
- Almaden Quicksilver County Park Project*,
- Boston Property Project*,
- Rivermark Project,

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* Projects considered in the Downtown Guadalupe River cumulative impacts analysis (appendix F).

- John P. McEnery Park Site Improvements*,
- Los Gatos Creek Trail Project*,
- City of San Jose Lower Guadalupe River Trail Project,
- Vasona Light Rail Extension Project*,
- Core Location Project*,
- Santa Clara Valley Water District Instream Recharge Program*,
- City of San Jose Riparian Corridor Policy Study*,
- Legacy Terrace Project,
- Lincoln/SR 237 Assemblage, and
- Future Lower Guadalupe River Road Crossings.

When combined with the Proposed Project, these projects have the potential to produce cumulative impacts on resources in the project area; therefore, they are addressed in this cumulative impact analysis.

With the exception of the Automated People Mover Project at San Jose International Airport, San Jose International Airport Fuel Storage Facility, New Green Island Bridge Project, ~~Pump Stations Emergency Operations Plan,~~ Local Drainage Pump Stations and Gravity Outfalls, Ulistac Natural Area, Nelo-Victor Pump Station Upgrade Project, Rivermark Project, Legacy Terrace Project, Lincoln/SR 237 Assemblage, and Future Lower Guadalupe River Road Crossings, the cumulative effects of these projects were evaluated in the *General Re-Evaluation and Environmental Report for Proposed Project Modification for Guadalupe River Project, Downtown San Jose, CA* (U.S. Army Corps of Engineers 2001). A summary discussion of these previously analyzed projects is provided in appendix F. Additional projects that were not considered in the previous cumulative impacts analysis are described below.

The District has conducted additional analyses of the local drainage inflow from the City of San Jose, City of Santa Clara and San Jose International Airport that could be accommodated within the Proposed LGRP design. Details of that investigation and modeling assumptions used to add local drainage data to the LGRP hydraulic modeling are contained in *Technical Memorandum, Evaluation of Effects of Interior Drainage Flows on LGR Hydraulic Conditions* (Northwest Hydraulic Consultants 2002).

Elevated Automated People Mover

The City has proposed the construction of an EAPM that would cross the Guadalupe River in reach A. The purpose of the EAPM would be to transport passengers from the San Jose International Airport terminals to the Guadalupe Light Rail Transit that runs down North First Street in San Jose. The project is planned to be an east-west single-track alignment that would cross 18.3 m (60 feet) above the river and be roughly 914.4 m (3,000 feet) long and 4 m (13 feet) wide. The project is proposed to be completed in 2006.

San Jose Airport New Fuel Storage Facility

Airport Master Plan Project S-1 includes construction of a 1.01-hectare (2.5-acre) fuel storage facility consisting of 4 tanks with a capacity of approximately 7.57 million liters (2 million gallons) on the vacant parcel north of U.S. 101 and west of the Guadalupe River. Project design is in process, and construction could continue through 2001. The project is part of the approved Airport Master Plan, and mitigation (i.e., setback from the river and fuel containment) was addressed in the 1997 master plan EIR (City of San Jose 1997). (Greene pers. comm.)

New Green Island Bridge

The New Green Island Bridge project is a proposed 2-lane crossing downstream of Airport Parkway and upstream of the existing Green Island Bridge. Construction is projected to begin in 2002. Currently, the Green Island Bridge is a 2-lane crossing that provides access from the San Jose International Airport to the car rental facility located at the area formally known as Green Island. When the New Green Island Bridge is complete, vehicles will be routed in a circular traffic pattern. One bridge will provide access from the car rental facility to the airport, and the other will provide access from the airport to the car rental facility (Hessler pers. comm.).

~~Pump Station Emergency Operations Plan~~

~~The Cities of San Jose and Santa Clara and the District are developing and implementing a plan to address restrictions on pumping stormwater to the lower Guadalupe River during major storm events. The District has indicated that the pumped discharge of stormwater to the Guadalupe River between the San Jose International Airport and Alviso will not be allowed during periods when the 481-cms (17,000-cfs) design flow of the LGRP is reached. Currently, 18 pump stations with a combined maximum capacity of 78.2 cms (2,763 cfs) are located along the LGRP. The plan, currently known~~

~~as the Pump Station Emergency Operations Plan, will establish operating criteria for pump stations during major storm events. Generally, these criteria would match pumping to available channel capacity. The plan is expected to establish a system for exchanging information between the District and pump operators with the intent of maximizing the use of available channel capacity during a major flood event. The plan will also address public safety issues, funding, and other emergency operations.~~

Local Drainage Pump Stations and Gravity Outfalls

The Cities of San Jose and Santa Clara operate 18 storm drain pump stations and 6 major gravity outfalls that discharge to the lower Guadalupe River between I-880 and the UPRR bridge. As a result of ongoing study of the local drainage issues and coordination with the Cities of San Jose and Santa Clara, the District reevaluated the local drainage pumped inflow assumption made in the Draft EIR. In the Draft EIR, interior drainage was assumed to be 78 cms (2,763 cfs) during a design flood event; this flow rate is approximately the cumulative total capacity of these major facilities. The phasing of these discharges with the timing of the river peak, however, reduces the cumulative effect of local drainage to approximately 38 cms (1,350 cfs). After further study, the District concluded that up to an additional 38 cms (1,350 cfs) from pump stations and outfalls could be conveyed by the Proposed Project. An Pump Emergency Operations Plan was determined to not be necessary for the design flood event. Details of the assumptions for this drainage study are contained in Appendix J (*Technical Memorandum, Evaluation of Effects of Interior Drainage Flows on LGR Hydraulic Conditions* [Northwest Hydraulic Consultants 2002]). The additional 38 cms (1,350 cfs) of flow would be safely conveyed assuming a slight reduction of the design freeboard from 1.1 to 0.9 meters (3.5 to 3 feet). Three feet of freeboard in the channel meets the Corps' freeboard requirement. Therefore, the flood flow evaluated in this chapter is 520 cms (18,350 cfs).

Ulistac Natural Area

The City of Santa Clara Parks and Recreation Department and the Santa Clara County Open Space and Sports Authority have begun developing a 16.2-hectare (40-acre) natural area between Tasman Drive and the Hetch Hetchy Aqueduct on the west side of the river called the Ulistac Natural Area. This area will preserve the native vegetation within the area and will include trails throughout the area for walking, running, nature viewing, and biking, with connecting ramps leading to the pathway along the west levee of the river. (Yee pers. comm.)

Nelo-Victor Pump Station Upgrade Project

This project will modernize the existing storm water pump station facility located approximately 600 m upstream of Montague Expressway, adjacent to the Guadalupe River. The pump station wet well, electrical/mechanical systems and pump house will be upgraded to increase total pumping capacity from 60 cfs to 160 cfs. The upgraded station would discharge 110 cfs to the river during the project design storm event. Additional rights-of-way will be acquired from private property owners, but no changes to the existing District right-of-way are necessary. The existing pump station outfall to the river will not be modified by this project.

Rivermark Project

The approximately 2.4-hectare (6-acre) vacant parcel immediately north of Montague Expressway and south of the Mansion Grove Apartments, and the approximately 5.7-hectare (14-acre) site just north of the Mansion Grove Apartments are in the process of being purchased from the State of California by a private developer ~~(Sun Microsystems)~~, who wants to develop the Rivermark project, which would include this parcel. The Rivermark project comprises single-family homes, an elementary school, fire station, library, and commercial uses. The project could support 7,000–9,000 people and is consistent with Santa Clara's general plan and zoning designations. Although no formal application has been submitted, the developer has presented conceptual plans to city planning staff (Martin, Riley pers. comms.)

City of San Jose Lower Guadalupe River Trail Project

The City general plan designates the levee crests of the lower Guadalupe River to support a class 1 paved recreational trail within the project area. The trail would support recreational uses, including walking, biking, and wildlife viewing for residents, workers, and tourists. South of the project area, the proposed trail would connect to an existing trail system within the Guadalupe River Park, a recreational area that borders the west banks of the downtown reaches of the river. North of the project area, the proposed trail would connect with an existing Bay Trail alignment, located in the San Francisco Bay National Wildlife refuge at the Gold Street crossing, providing access to the Bay to recreators within the greater San Jose area.

Legacy Terrace Project

The Legacy Terrace project is located near the UPRR tracks at the former Cargill landfill (also known as the SR 237 landfill) site west of Gold Street, between lower Guadalupe River and SR 237. The land is currently owned by Legacy Partners (formerly by Lincoln Property). The Legacy Terrace project divides the site into 3 parts. The south campus area (approximately 15.7 hectares [38.8 acres]) includes the construction of 5 commercial buildings (92,900 m^2 [1 million square feet] of office space), a 175-room hotel, and associated parking. The riverfront commercial area (approximately 2.6 hectares [6.4 acres]) includes areas near the Guadalupe River that will be used for restaurant, retail, or community facilities. The open space preserve (approximately 102.4 hectares [25.3 acres]) will be located on the north portion of the project site, adjacent to San Tomas Aquino Creek and the salt ponds. (H.T. Harvey & Associates 1999.) A specific plan was drafted and the public review period for the draft EIR ended December 6, 1999; however, the city approval process has not begun (Corliss pers. comm.).

Lincoln/SR 237 Assemblage

This project site includes the strip of land bounded by Gold Street on the west, UPRR tracks on the east, lower Guadalupe River on the north, and SR 237 on the south. This was also analyzed as parts 3 and 4 of the SR 237 Assemblage project (H.T. Harvey & Associates 1997b). Parts 1 and 2 are the Legacy Technical Park across Gold Street. Current planned uses are a research and development facility and restaurant.

Lower Guadalupe River Road Crossings

According to the *Valley Transportation Plan* 2020, there are plans and funds to expand the Trimble Road bridge that crosses the lower Guadalupe River. Additional future projects within the LGRP area include expanding the Montague Expressway and I-880 bridges, constructing a bridge over the lower Guadalupe River at the SR 87/U.S. 101 interchange, and constructing a bike path over the river near the River Oaks development between Montague Expressway and Tasman Drive (Ristow pers. comm.).

LGRP Cumulative Impacts and Mitigation Measures

Approach to Cumulative Impacts

Cumulative impacts under the Proposed Project are closely associated with the cumulative impacts identified for the Guadalupe River Project, Downtown San Jose, California (U.S. Army Corps of Engineers 2001), which is located immediately upstream of the LGRP. The full text of this previous cumulative impact analysis is presented in appendix F to provide the context for the LGRP cumulative impact analyses and to avoid the need to repeat all of the previous analyses. This LGRP cumulative impact analysis presents the major conclusions from the downtown San Jose project's cumulative impact analyses and is focused on those cumulative impacts that can be better evaluated as a result of the District's identification of a specific LGRP Proposed Project. This LGRP cumulative impact analysis addresses all significant cumulative impacts that could result from projects that could affect Guadalupe River resources and resources downstream of the LGRP area.

The *Guadalupe River Project, Downtown San Jose, California EIR/SEIS* (U.S. Army Corps of Engineers 2001) evaluated the cumulative impacts that could result from the Downtown Guadalupe River Project and other past, present, and reasonably foreseeable projects including the LGRP. This previous cumulative impact analysis specifically references consideration of 18 of the 30 projects identified above. Because details of the LGRP design were unknown at the time of this previous cumulative impacts analysis, the Corps and District evaluated the LGRP contribution to cumulative impacts on the Guadalupe River based on several assumptions:

- The District would implement the LGRP to restore channel capacity guaranteed in the District's 1991 agreement with the Corps and to provide channel capacity to convey flows from the Downtown Guadalupe River Project and the Upper Guadalupe River Project.
- The LGRP alternatives would be designed to minimize or avoid impacts on environmental resources in the Guadalupe River watershed, including listed species and their habitat.
- The LGRP EIR would present analyses of the cumulative impacts on the Alviso Slough area.
- The LGRP contribution to cumulative impacts would be within the range of an assumed alternative that would require removal of sediment from the reach of the Guadalupe River between U.S. 101 and the UPRR and an assumed alternative that would largely avoid instream work.
- The entire Guadalupe River Project would not be made operational until the LGRP has been completed. (U.S. Army Corps of Engineers 2001.)

Because of uncertainties about the LGRP, the major conclusions from the Downtown Guadalupe River Project cumulative impact analyses indicated that many of the cumulative impacts were less than significant, but that when details of the LGRP were known, cumulative impact conclusions could change. To aid in discussing the changes in cumulative impacts that would occur with implementation of the LGRP, the following conclusions from the

Downtown Guadalupe River Project cumulative impact analyses are summarized briefly below. The conclusions from this previous analysis takes the following conditions into consideration:

- **Hydrologic and Hydraulic Conditions.** The potential for increased lower Guadalupe River flow velocities was unknown. The potential for the total volume of floodflows to reach the south bay faster with the Guadalupe River projects would be a less-than-significant impact because only a slight change in delivery of floodflows would be expected and flooding is infrequent.
- **River Geomorphology.** Cumulative construction and operational impacts on Guadalupe River morphology are less than significant because erosion control programs would be implemented, cumulative projects would not substantially alter the sediment load or transport characteristics of the river, and no major changes in channel morphology would be created by flood-control structures.
- **Water Quality.** Cumulative projects would not significantly affect the amount of suspended solids and biostimulatory nutrients in the Guadalupe River system after temporary construction effects occur, and proposed projects would not alter river washload. Potential effects of toxic contaminants from accidental construction spills would be less than significant because toxic materials control and response plans would be implemented during construction. Mercury contamination and the potential for mercury methylation in the Guadalupe River watershed is an ongoing regional concern that is considered a significant cumulative impact. Mitigation measures include collaborating with the SFBRWQCB to assess the potential for mercury transport and for mercury methylation, and to implement a TMDL or similar program for mercury for San Francisco Bay. These are regional measures and, when implemented, would address any cumulative effects the LGRP would have on mercury contamination. Cumulative stream temperature and dissolved oxygen effects are considered less than significant with mitigation measures required for replacing SRA cover.
- **Vegetation.** Approximately 44.5 hectares (110 acres) of riparian vegetation impacts would result from projects with direct impacts in the Guadalupe River watershed. Approximately 58.47 hectares (144.49 acres) of riparian vegetation mitigation have been proposed or are already implemented. With mitigation, cumulative impacts on riparian vegetation in the Guadalupe River watershed are considered less than significant. Loss of SRA cover and wetlands from implementing the Upper and Downtown Guadalupe River Projects and other cumulative projects would be less than significant because these losses would be fully

mitigated. SRA cover would be more than doubled for the 2 projects. Cumulative projects (with the possible exception of the LGRP) would have no direct construction-related effects on salt marshes and wetlands in Alviso Slough and would not result in changes to the depth, frequency, or duration of inundation of Alviso Slough marsh habitat or salt ponds because the Downtown Guadalupe River and Upper Guadalupe River Projects would not operate until the LGRP is constructed. (Note: Any impacts of these 2 projects have been fully accounted for in the analysis of the LGRP impacts.)

- **Wildlife.** The cumulative impact of disturbance to wildlife resulting from human activities on the Guadalupe River is considered less than significant because wildlife is already subjected to substantial disturbance, habitat mitigation is provided, and wildlife disturbance would increase even in the absence of cumulative projects. Potential cumulative impacts on California red-legged frog, western snowy plover, California clapper rail, and salt marsh harvest mouse are considered less than significant because there is no suitable habitat for the California red-legged frog, and cumulative projects would not change the depth, frequency, or duration of inundation on habitat that support any of these species. The Corps and District would also require pumping of Pond A8D between January and May (in areas of western snowy plover habitat). Monitoring of hydrologic conditions would be required as a condition of the biological opinion for the Downtown Guadalupe River Project (please refer to appendix F for complete text of this analysis).
- **Fisheries.** Cumulative changes in channel hydraulics under the Downtown Guadalupe River and Upper Guadalupe Projects would not affect fish migration or fish habitat because there would be no channel maintenance and medium-range flow changes under these projects and no loss fish habitat. Similarly, potential cumulative impacts on fish or fish habitat from channel erosion or deposition, river morphological changes, changes in water quality, temperature, or dissolve oxygen are considered less than significant because, there would be either no substantial effect or compensatory mitigation would be implemented to reduce effects (e.g., SRA cover mitigation for temperature effects).
- **Cultural Resources.** The Downtown Guadalupe River Project would not contribute to the cumulative loss of known historic or prehistoric cultural resources because none would be affected during construction. This impact is less than significant.
- **Other Resource Areas.** Cumulative impacts associated with other resources issues, including land use, recreation and aesthetics,

transportation and traffic, air quality, noise, and hazards and hazardous materials, were determined to be less than significant.

Cumulative Impacts

Cumulative impacts discussed below are based on a review of the cumulative impact conclusions presented in the EIS/EIR for the Downtown Guadalupe River Project, and on what is now known about the LGRP and other projects not considered in that EIS/EIR. The previous cumulative impact conclusions (from the Downtown Guadalupe EIS/EIR) are considered valid. The conclusions in this chapter represent the updated cumulative impacts on Guadalupe River resources.

The analysis focuses on cumulative impacts that could result from projects that could directly affect the Guadalupe River channel or change its floodflows. Because of this focus, cumulative projects listed above that would not directly affect river resources or change flood-control operations or flows because they are located outside the channel were considered to have a less-than-significant cumulative impact on Guadalupe River resources. The analysis therefore focuses on the cumulative impacts of projects that would affect in-channel resources, as considered in the EIS/EIR for the downtown project; it also focuses on additional projects not considered in the previous analysis, including the Airport People Mover Project, New Green Island Bridge Project, the future bridge expansion projects at I-880, Trimble Road, and Montague Expressway, local drainage pumped inflows and gravity outfalls to the lower Guadalupe River, and the Proposed Project.

Hydrologic and Hydraulic Conditions

The LGRP, in combination with other major projects as indicated above, including the Upper Guadalupe River Project, ~~and~~ Downtown Guadalupe River Project and local drainage inflows from the Cities of San Jose and Santa Clara ~~would allow conveyance of~~ could convey up to 520 cms (18,350 cfs) through the LGRP with the Corps' 3-foot freeboard requirement. This is a slight change from the 1.1-meter (3.5-foot) freeboard requirement used in the Draft EIR. The 1.1-meter (3.5-foot) freeboard criterion used in the Draft EIR was that defined in the District's "Engineering Policies & Procedures" #3-218. The District policy provides for a more stringent freeboard than the Corps and FEMA. The Policy contains a provision that states that "Any determination to relax freeboard requirements shall be made by the Flood Control Department Manager after consideration of economic and social impacts." This determination has been made by the district watershed manager, after consideration of the cost and completion schedule impacts of raising the levee profiles an additional six inches to provide for additional capacity for interior drainage pumping. Additional levee raising would require right-of-way acquisition, construction of retaining walls, encroachment into biologically sensitive areas, or some combination of all of these measures. Based on this determination and considering that the 0.9-meter (3-foot) freeboard criterion is a minimum limit which will allow the Corps to certify the project design and the FIRM (Flood Insurance Rate Map) Maps to be amended, the freeboard reduction from 1.1 to 0.9 meter (3.5 to 3.0 feet) is considered an insignificant impact.

The cumulative lower Guadalupe River flood flow is estimated to increase the water surface elevations by between 0.02 meter (0.10 feet) and 0.15 meter (0.49 feet) and would slightly increase the mean channel velocities (compared to the Proposed Project) at bridge crossings. The cumulative change in water surface elevations compared to existing conditions is not comparable because under existing conditions floodflows are not contained within the channel. Under the Proposed Project, the soffits of the Airport Parkway, U.S. 101, Montague Expressway, Tasman Drive, Gold Street and UPRR bridges would be submerged to depths ranging from 0.04 meter (0.13 feet) to 0.69 meter (2.26 feet) (Northwest Hydraulic Consultants 2002). Water surface elevations at the downstream side of I-880 would increase to approximately 17.91 meters (58.75 feet) which is slightly higher than the 17.86 meter (58.59 feet) LGRP design criteria. A sensitivity analysis was also performed to determine the potential effects on water surface elevations of floating debris jams at upstream faces of lower Guadalupe River bridges. This analysis showed that water surface profiles increased between 0.08 and 0.56 meter (0.3 and 1.8 feet) at bridges and most bridges experienced pressurized flow (Northwest Hydraulic Consultants 2002).

Guadalupe River Hydrologic and Hydraulic Effects. No significant cumulative hydrologic or hydraulic conditions would be created in the Guadalupe River from implementation of these cumulative projects with the additional local drainage inflow because, these projects would adequately convey the design floodflows through the Upper and Downtown Guadalupe River projects and the LGRP would accommodate a cumulative flow of up to 520 cms (18,350 cfs) (Northwest Hydraulic Consultants 2002). This improved hydraulic condition would reduce flood hazards in areas upstream of the LGRP and would substantially improve flooding adjacent to the lower Guadalupe River by improving levees and reducing the potential for flood flow overtopping of levees. Cumulative projects would also allow continuous operation of City local drainage pump stations and gravity outfalls during the design flood event based on the conditions stipulated in

NHC 2002 (see appendix J). Because local drainage facilities would continue to operate during flooding conditions, the local drainage and flooding conditions in both the Cities of San Jose and Santa Clara would improve compared to pre-project conditions. Under existing conditions, the lower Guadalupe River will not be able to accommodate all pumped inflows during the design event. Floodwaters spilled upstream would flow into the streets of downtown San Jose and continue down North First Street, flooding areas along the way.

In addition, upstream projects would not substantially change channel maintenance flows, flow depths, and flow velocities in the Guadalupe River because cumulative projects would not change the upstream watershed hydrology. With the Proposed Project, there would be no additional significant cumulative hydrologic and hydraulic impacts in the lower Guadalupe River because proposed floodwalls, raised levees, and channel management would not substantially change the channel maintenance flow or flow depth and velocity during most storm events, including small storm events, in the lower Guadalupe River. In addition, other cumulative projects that could potentially affect the lower Guadalupe River channel, such as the San Jose International Airport people mover bridge, New Green Island Bridge, and future expansions of the Trimble Road, Montague Expressway, and I-880 bridges would not substantially affect lower Guadalupe River flows, flow depth, or velocity because these projects would be required to incorporate the hydraulic objectives of the LGRP in project design.

Implementation of the LGRP with other cumulative projects would also not result in substantial cumulative changes in the volume or timing of freshwater flow to the south bay, because none of the construction or maintenance features of the Proposed Project or other cumulative projects would change the hydrologic conditions in the basin. Constructing floodwalls or raising levees under the Proposed Project with 520 cms (18,350 cfs) would result in the total volume of floodflows reaching the south bay hours or a day earlier than under existing conditions (U.S. Army Corps of Engineers 2001), but this change is considered minor because the change in delivery time would be small, flooding would be infrequent, and few or no adverse effects would be expected from this change.

Downstream Flooding

As indicated in the "Hydrologic and Hydraulic Conditions" section of chapter 3, implementation of the Proposed Project ~~would~~ could result in downstream-induced flooding in the town of Alviso and Cargill salt ponds related to the LGRP's ability to contain the design floodflow from upstream reaches. To reduce these potential flooding impacts, the District has proposed the Baylands Mitigation Measure to address the downstream flooding contribution of the Guadalupe River in these areas. Once the LGRP, Downtown Guadalupe River Project, and Upper Guadalupe River Project are completed and placed in operation, flooding is expected to continue in the baylands study area, which includes Alviso Slough, the Cargill salt ponds, the USFWS wildlife refuge (salt pond A6), and the town of Alviso. Compared to existing conditions, the depth and duration of flooding from cumulative projects would increase in salt ponds A8W, A5, A6, A7, A8D, but would decrease in the town of Alviso and New Chicago Marsh. The Baylands Mitigation Measure (specifically, the Alviso Slough weir) is also designed to minimize flood flow impacts in Alviso Slough by maintaining water surface elevations to about the elevations that would occur under existing flooding conditions. The flooding contribution made by the ~~Proposed Project~~ cumulative Guadalupe River projects and flood flow conditions relative to the contribution of other hydrologic units (i.e., Coyote Creek, Guadalupe Slough,) during a major storm event would primarily be into the salt ponds west of Alviso Slough. The LGRP Engineer's Report provides a detailed discussion of the hydrologic modeling efforts including the assumptions and methods used in conducting the evaluation (Northwest Hydraulic Consultants 2001) and the *Technical Memorandum, Evaluation of Effects of Interior Drainage Flows on LGR Hydraulic Conditions* (Northwest Hydraulic Consultants 2002), updates these analyses to include consideration of up to a 520 cms (18,350 cfs) flow reaching Alviso Slough. Other cumulative projects that involve crossing the lower Guadalupe River would have no cumulative hydrologic or hydraulic impacts in the baylands study area because they would not change the floodflows in the lower Guadalupe River.

Salt Pond Flooding. The cumulative hydrologic effect of operation of the LGRP in combination with other projects on the Cargill salt ponds would be ~~the same as the~~ similar to project-level effects described in the "Hydrologic and Hydraulic Conditions" section of chapter 3 except that 0.15 meter (0.5 foot) deeper flooding in ponds A5, A7, A8D, and A8W, and 0.38 meter (1.25 feet) deeper flooding in pond A6, would occur than predicted with just the Proposed Project with the Baylands Mitigation Measure in place. During a flood event, water would enter the Cargill salt ponds through the levee located just downstream of the UPRR bridge. Flooding of the Cargill salt ponds west of Alviso Slough would be attributable to only flows entering from the Guadalupe River because only the water behind the levee just downstream of the UPRR bridge would spill over into the salt ponds. ~~Floodwaters entering the Cargill salt ponds are not expected to flow onto the USFWS refuge parcel because the berm between the salt pond and the refuge is considered adequate to protect the refuge from flooding. The project-level~~

Table 4-1. Projects with Direct Cumulative Impacts on the Riparian Habitat in the Guadalupe River Watershed and Mitigation Required (acres)

	Impact	Mitigation
Guadalupe River Project with Bypass System Alternative	14.12	21.0
Guadalupe River Park Project	0.0[a]	0.0[a]
SR 87 Freeway Upgrade from U.S. 101 to Julian Street	5.74	10.95
SR 85 Transportation Corridor Project	0.1[b]	12.1
Santa Clara Valley Water District Fish Ladder Construction Program	0.1	0.2
Guadalupe Creek Restoration Project	0.51	1.00
Upper Guadalupe River Flood Control Project	10.45	20.89[c]
Lower Guadalupe River Flood Protection Project		
Construction	2.74	2.74[d]
Vegetation and Sediment Management	1.91	3.82
SCVWD Stream Maintenance Program	78.0	78.0[f]
Los Gatos Creek Trail Project Phase IIA.A	0.25	0.62
Vasona Light Rail Extension Project	0.23	0.23
Airport Automated People Mover (*to be determined*)[g]	—	—
Total	**113.97**	**151.55**

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[a] Impacts on riparian habitat and mitigation are included in the Guadalupe River Project with Bypass System Alternative.

[b] The project will directly affect 0.1 acre of riparian vegetation along the Guadalupe River mainstem and indirectly affect 4.5 acres on Los Gatos and Ross Creeks. Mitigation for loss of riparian habitat requires planting 12.1 acres of riparian vegetation on-site and 0.2 acre off-site (Monette 1992).

[c] An additional 5.53 acres will be established by SCVWD for use as mitigation for other projects.

[d] Assumes mitigation ratio of 1:1.

[e] Assumes mitigation ratio of 2:1.

[f] Estimate: includes proposed giant reed control and revegetation (Santa Clara Valley Water District 2001).

[g] Impacts associated with this project have not yet been determined.

~~flood-related impacts (assuming 481 cms (17,000 cfs)) on the Cargill salt ponds would be reduced to a less-than-significant level by implementing Mitigation Measures HH-2, HH-3, and HH-4 presented in the "Hydrologic and Hydraulic Conditions" section of chapter 3. These measures include a weir that would allow water to enter the salt ponds in a controlled fashion, and temporary pumps to ensure that the ponds drain more quickly than under existing conditions. There would be no~~ With implementation of the Mitigation Measures HH-1 through HH-4, the cumulative hydrologic effects associated with flooding of the Cargill salt ponds A5, A6, A7, A8D, and A8W are considered less than significant because ~~flooding of the salt ponds would be attributable only to operation of the LGRP and not flows from Guadalupe Slough or Coyote Creek. No additional mitigation beyond what is recommended for the Proposed Project is required.~~ ponds would be flooded only during infrequent flood events and these ponds are already subject to infrequent flooding under existing conditions. The cumulative floodflow scenario of 520 cms (18,350 cfs) would increase the depth of flooding in these ponds, compared to existing conditions by between 0.7 and 1.0 meters (2.3 and 3.2 feet). The cumulative increase in pond flooding depths, compared to the Proposed Project conditions (at 481 cms [17,000 cfs]), would be minor, ranging from 0.15 and 0.4 meter (0.5 to 1.2 feet). In addition, the Baylands Mitigation Measure recommended for the Proposed Project would reduce the flooding depth and duration in these ponds using temporary pumps (Mitigation Measure HH-3) to evacuate flood waters faster than the rate that would occur under existing conditions.

Flooding under the cumulative flow scenario (520 cms [18,350 cfs]) could contribute to approximately 2.5 meters (8.3 feet) of flooding in Pond A8D. Under existing conditions, Pond A8D would flood to a depth of 1.8 meters (5.9 feet), and it would flood to a depth of 2.2 meters (7.2 feet) under the Proposed Project with the Baylands Mitigation Measure. Infrequent flooding in Pond A8D to depths of approximately 2.5 meters (8.3 feet), assuming the cumulative flooding scenario, is considered a significant cumulative impact. Pond A8D is a known breeding site for a regularly occurring population of western snowy plover. Implementation of Mitigation Measure HH-3 would reduce this impact to a less-than-significant level. Mitigation Measure HH-3 would evacuate flood waters from Pond A8D in a timely manner and would avoid impacts on the snowy plover breeding season.

Pond A6 Flooding. Based on an assessment of aerial photos, approximately 3.08 kilometers (1.92 miles) of the shelf area along Pond A6 is variably vegetated (up to 85%) with diked salt marsh vegetation which is potentially jurisdictional under Section 404 of the Clean Water Act.

Assuming up to 4.6 meters (15 feet) (the total average width) of this shelf area is inundated, the estimated area of potential wetlands to be inundated along the pond is 1.2 hectares (3.0 acres) under the 520 cms (18,350 cfs) flooding scenario. The 0.4 meter (1.25 feet) difference in depth of inundation between the 481 cms (17,000 cfs) and 520 cms (18,350 cfs) flooding scenarios therefore represents an increase of about 0.4 hectare (1 acre) of flooding of diked salt marsh habitat within the pond basin and is expected to completely inundate the vegetation along the shelf and the toe of the levee as elevation permits. Combined with the estimated 0.2 hectare (0.5 acre) of inundated diked salt marsh habitat on the salt pan which will already have been inundated by the 481 cms (17,000 cfs) event, the total extent of flooding of this habitat under the 520 cms (18,350 cfs) scenario is 2 hectares (5 acres).

Diked salt marsh vegetation is relatively common within the Baylands, and temporary impacts due to flooding this habitat within Pond A6 is less than significant. However, minor flooding in this pond would require temporary pumps to be operated on this pond to avoid flooding impacts to the refuge and minimize potential impacts on habitat for resources such as the salt marsh harvest mouse. With Mitigation Measure HH-3 in place, the cumulative hydrologic impacts on Pond A6 are reduced to a less-than-significant level.

Flooding under the cumulative flow scenario (520 cms (18,350 cfs)) could contribute to approximately 1.0 meter (3.25 feet) of flooding in Pond A6 (Northwest Hydraulic Consultants 2002). This is considered a significant cumulative impact. Pond A6 is a breeding site for one of the largest California gull colonies in the state, may support breeding populations of the western snowy plover, and provides potential habitat for the salt marsh harvest mouse. Pond A6 flooding will take some time to reach maximum depth, hence any salt marsh harvest mice, if present, could move into the higher areas of the vegetated band. Therefore, such flooding would temporarily displace any mice present but would not be a significant impact or constitute "take" of the mice. The high tides upon which the hydrologic models are based could force some salt marsh harvest mice from the outboard tidal salt marsh into Pond A6, but that would be a temporary situation, as the mice would likely move back after the tide passes. The salt marsh harvest mouse is adapted to be able to respond to such high tide events and presumably can tolerate temporary crowding. Implementation of Mitigation Measure HH-3 will reduce these impacts to a less-than-significant level.

Alviso and New Chicago Marsh Flooding. As discussed in the "Hydrologic and Hydraulic Conditions" section of chapter 3, modeling indicates that flood-control operations would result in a decrease in the depth and duration of inundation at Alviso during major flood events. Implementing Mitigation Measure HH-1 is expected to further reduce the potential for flooding through the Marina by improving the levee along the northwest side of Alviso. In addition, the volume of overland flow that originates from south of Alviso is expected to decrease~~ with implementation of the Pump Stations Emergency Operations Plan.~~ because the Proposed Project would contain lower Guadalupe River design flood flows and major City drainage pumps and gravity outfalls would be allowed to discharge continuously to the lower Guadalupe River during design flood conditions (Northwest Hydraulic Consultants 2002). The model of the Proposed Project with Baylands Mitigation Measure hydrologic conditions indicates that, although Alviso would continue to be flooded from other sources, the estimated depth and duration of flooding during any of the modeled events would be less than estimated for project conditions without the mitigation measure.

Similarly, the Proposed Project and proposed mitigation measures will reduce flooding in the adjoining New Chicago Marsh. Accommodating the pump flows from interior drainage will reduce overland flooding into both Alviso and New Chicago Marsh.

New Chicago Marsh is a large, very high quality site for salt marsh harvest mouse and supports an important population of this species. Under existing conditions, there is no refuge for mice when 1.8 meters (6 feet) of inundation occurs, and a flood is devastating to the population. Under the Proposed Project, flooding in New Chicago Marsh is reduced to 0.8 meter (2.6 feet) of inundation, and mice can move to the high spots in the marsh, climb up the pickleweed, and have a better chance of surviving the flood. The Proposed Project will therefore benefit numerous salt marsh harvest mice in New Chicago Marsh.

Although Alviso and New Chicago Marsh would continue to be at risk of flooding, the Proposed Project with the Baylands Mitigation Measure would not contribute to cumulative flooding effects in Alviso and would help improve flooding conditions. No additional mitigation beyond what is recommended for the Proposed Project is required.

Levee Stability and Flood Hazards. Under a cumulative flood flow scenario of 520 cms (18,350 cfs) the depth and duration of flooding in Cargill Ponds A8W, A8D, A5, A6, and A7 would increase slightly from

Proposed Project conditions. Infrequent storage of floodwaters in these ponds under cumulative flow conditions would increase the volume of water that comes in contact with the sides of the levees that separate salt ponds from Guadalupe and Alviso Sloughs. This additional water could increase the risk that these, largely unengineered levees could be damaged or fail. The District has considered the potential for flooding impacts associated with overtopping and failure of the west Alviso Slough levee that separates the slough from ponds A8W, A5 and A7. The main concern has been to avoid conditions that could result in levee failure that in turn could result in flood hazards in the community of Alviso. Although no levee stability or engineering analysis has been conducted to predict the probability that the Alviso Slough west or east levees could fail under Proposed Project or cumulative flow conditions, this potential does exist as it does under existing conditions and is therefore considered less than significant.

However, compared to existing Baylands study area flooding conditions, that include substantial flooding in Cargill Ponds and increased significant floodflows in Alviso Slough, flood hazards related to levee stability issues are expected to be less severe under the cumulative flooding scenario at 520 cms (18,350 cfs) because directing cumulative flood flows to Cargill ponds on the west side of Alviso Slough would provide greater flood protection for the community of Alviso. Directing floodflows to ponds A8W, A8D, A5, A7, and A6 via the Alviso Weir (Mitigation Measure HH-2) would allow adequate storage of flood volumes under cumulative conditions. The potential for catastrophic flooding in the community of Alviso because of a levee failure is less under the cumulative (and Proposed Project) conditions because the potential for increasing flow in Alviso Slough is mitigated with an engineered weir in the pond A8W levee. Increased flow in Alviso Slough could increase the potential for failure of the east Alviso Slough levee, which would likely result in flooding in Cargill ponds east of Alviso Slough and potential catastrophic "back door" flooding in the community of Alviso over the railroad embankment east of the Alviso Marina . Under cumulative flooding conditions (and Proposed Project conditions), potential failure of the west Alviso Slough levee (adjacent to Cargill ponds A8W, A5 and A7) would be less hazardous for the community of Alviso than failure of the east Alviso Slough levee. Both the east and west Alviso Slough levees would have to fail for floodwaters stored in ponds west of Alviso Slough to reach the community of Alviso. Under cumulative flooding conditions (and Proposed Project conditions), the risk of catastrophic flooding (related to slough levee failure) is also reduced by constructing the west-perimeter levee around the community of Alviso (Mitigation Measure HH-1) and by pumping Cargill ponds to reduce the amount of time that the Alviso Slough west levee has flood waters pond on its sides. This potential cumulative impact would be less than significant because flood hazards under this condition, which includes the LGRP and Baylands Mitigation Measure, would be less than those expected under existing conditions.

Cumulative flooding conditions (assuming the LGRP Proposed Project and mitigation measures in place) could also have some effect on internal Cargill salt pond levees. Flooding depths in Ponds A8D, A8W, A5, and A7 under the cumulative conditions would be greater than under existing conditions, but would not substantially increase the risk of internal levee failure compared to existing conditions because the levee overtopping condition already exists and the risk of levee failure from floodflow downcutting of the levees currently exists. The Proposed Project under cumulative conditions would not reduce the risk of levee failure (compared to existing conditions), but also would not substantially increase this risk. Armoring of internal levees is not proposed because the levees are overtopped under existing conditions, thus risk of levee failure in these areas is not an impact of the Proposed Project. Therefore, this potential cumulative impact is considered less-than-significant because internal salt pond levees would be flooded under existing conditions and the District's Mitigation Measure HH-3 would reduce the amount of time that internal levees would be flooded. No additional mitigation is required.

~~Under existing and cumulative conditions, flood control on the lower Guadalupe River would require modification of the manner in which pump stations are operated, whether or not the Proposed Project is implemented. Proper function of the lower Guadalupe River as a flood conveyance channel under existing conditions (without the LGRP) would require pump station inflow to be restricted when flows reach the design capacity of the channel. Under the cumulative conditions with the Proposed Project assumed, inflow from drainage pump stations would be restricted when flows reach the 481-cms (17,000-cfs) design capacity of the project. During major flood events, inflow would be restricted or eliminated from 17 pump stations that extend from San Jose International Airport to Alviso. These pump stations are operated by the cities of San Jose and Santa Clara. Implementation of an emergency operations plan for pump stations (Pump Stations Emergency Operations Plan) in San Jose and Santa Clara that discharge to the Guadalupe River is currently being developed. During major flood events, pumping would not be allowed when flows in the Guadalupe River are near the 481-cms (17,000-cfs) design capacity of the LGRP Proposed Project. Depending on the severity of a flood event and the amount of water that would need to be pumped by each station, the cumulative effect of operating the LGRP and limiting the operation of each pump station under the current localized flooding conditions could result in continued localized flooding in~~

~~areas served by pump stations. Depending on depth and duration, restricting pumping could result in significant cumulative impacts on the areas served by each pump station.~~

Emergency Pumping

The District has determined that the LGRP Proposed Project could accommodate the amount of local drainage pumping and gravity outfall drainage under cumulative flow conditions (520 cms [18,350 cfs]) as discussed above, and that City pumps and gravity outfalls would not be interrupted. Accommodating this additional drainage under a design event will reduce the freeboard in the river by 0.5 feet (i.e., from 3.5 feet to 3.0 feet). This design represents a minor change to the 3.5-foot freeboard requirement under District policy and referenced in the Draft EIR, but conforms to the FEMA (and Corps) guideline. The 3 feet of freeboard is a minimum limit which will allow the Corps to certify the project design and amend the FIRM maps. Therefore, cumulative flooding impacts of operating these drainage facilities is less than significant.

~~**Mitigation Measure C-2: Develop and Implement Pump Station Emergency Operations Plan.** To reduce this impact to a less-than-significant level, the District will assist the Cities of San Jose and Santa Clara in developing and implementing a Pump Station Emergency Operations Plan (EOP) for pump stations that discharge to the reach of the Guadalupe River encompassed by the Proposed Project. The District will ensure that, during major storm events, operators are provided real-time hydrologic data regarding riverflows and estimates of the hydrologic conditions expected at each pump outfall, including estimates of the time, location, and duration of peak flows. This will help operators maximize pumping before and after peak flows pass an outfall and implement other management actions, if necessary.~~

~~The District has committed to developing and implementing a successful plan for emergency operations of pump stations and has met with representatives of the Cities of San Jose and Santa Clara to discuss this plan. However, implementation of the plan is not entirely within the District's control.~~

~~In the unlikely event that Mitigation Measure C-1 is not successfully implemented and unlimited pumping to the lower Guadalupe River continues, it is possible (depending on the depth and duration of flooding) that the design floodflow capacity of the LGRP could be exceeded or that lower Guadalupe River channel freeboard would be reduced. If the LGRP levees were overtopped, uncontrolled flooding in streets adjacent to the~~

~~lower Guadalupe River channel would result, potentially causing flood damage and safety concerns. Downstream of the LGRP, up to approximately 566 cms (20,000 cfs) of flow at Alviso Slough would result in increased flooding in Cargill Ponds A5, A7, A8D, and A8W and potential flooding in New Chicago Marsh and the town of Alviso.~~

~~Without Mitigation Measure C-1, the depth and duration of flooding would be expected to be greater than under the Proposed Project (with the Baylands Mitigation Measure); there could be increased flooding impacts in the town of Alviso, and on marsh habitat upon which special-status wildlife species depend. In addition, the Baylands Mitigation Measure would need to be modified. Such a modification could include a slightly larger overflow weir (Mitigation Measure HH-2) and a slightly larger Alviso levee (or floodwall) (Mitigation Measure HH-1) to ensure that the Baylands Mitigation Measure would function properly. Impacts of slightly expanding these facilities would be similar to the impacts previously identified for the Baylands Mitigation Measure in chapter 3.~~

River Geomorphology

The cumulative contribution of the LGRP to Guadalupe River morphological conditions is considered less than significant because ~~Proposed Project~~ cumulative project flood-control features and ~~vegetation and sediment management~~ channel modifications, assuming lower Guadalupe River flows of 520 cms (18,350 cfs), would not increase channel erosion or deposition and would not change the current river sediment load or sediment transport conditions because flood flow conditions would be infrequent. Construction features or operations under the Proposed Project also would not change the riffle/run/pool pattern in the lower Guadalupe River because only minor structural changes would take place in the active low-flow channel, and upstream flood-control projects have mitigated all potential impacts on geomorphology to less-than-significant levels (see appendix F). Other proposed bridge crossings would not significantly change the Guadalupe River morphology because they would not change the sediment load or riffle/run/pool pattern in the river. As part of this project, the District is implementing an adaptive management plan to monitor potential changes in river geomorphology within the project area.

Water Quality

Impacts of cumulative projects on Guadalupe River water quality are considered less than significant for the reasons listed below.

- The potential to increase suspended solids and biostimulatory nutrients in the Guadalupe River would be minor because regulatory requirements under NPDES permits would require construction BMPs for erosion control, and soil-disturbing activities would be conducted in compliance with approved erosion and sediment control and vegetation removal plans and MMPs.
- Operation and maintenance of flood protection projects or other cumulative projects that could affect the river channel, including the LGRP on the Guadalupe River, would not cause long-term changes in the transport of washload sediments in the channel because soil management and erosion control plans would be implemented for flood-control and other projects.
- Cumulative impacts of toxic contaminants would be minor because toxic materials control and spill-response plans would be implemented for construction projects on the river to avoid or control potential accidents.
- Flood protection projects, including the LGRP, and bridge crossing projects on the Guadalupe River would not affect the source or input of mercury into the system, the LGRP sediment management program would reduce the amount of sediment deposited in the south bay, and a soil management plan would be implemented for all projects on the Guadalupe River to ensure proper disposal or reuse of soils during construction and maintenance.
- The potential for conversion of sediment-bound mercury into soluable methyl mercury in the Guadalupe River is currently being assessed in coordination with SFBRWQCB, and a TMDL for mercury for San Francisco Bay is proposed to significantly reduce the Guadalupe River transport of mercury to San Francisco Bay.
- No cumulative impacts on water temperature or dissolved oxygen are expected because the impacts would be fully mitigated at the project level. The LGRP would not contribute to a cumulative effect on water temperature or dissolved oxygen because the quality of water passing through the Downtown Guadalupe River Project and into the upstream end of the LGRP is not expected to change from preproject levels. In addition, the project-level effects on construction and operation of the LGRP are not expected to have an adverse effect on water temperature or dissolved oxygen because there would be no substantial in-channel work and very little riparian vegetation or SRA cover would be removed.

A detailed discussion of the Guadalupe River water quality conditions and impact mechanisms, as presented in the Downtown Guadalupe River Project cumulative impacts, is attached in appendix F. Please refer to this discussion for background information on these potential cumulative impacts on water quality.

Vegetation

Riparian Vegetation

Table 4-1 summarizes the approximate project-level and cumulative acreage of riparian habitat loss resulting from projects under construction or recently approved in the Guadalupe River watershed, including the LGRP. Most of the impacts would be on cottonwood/willow forest, which has high botanical and wildlife values. The Upper Guadalupe River Project, Downtown Guadalupe River Project, and the Proposed Project would contribute to impacts on approximately 11.8 hectares (29.2 acres) of riparian habitat. Additional riparian vegetation impacts could potentially result from the San Jose International Airport People Mover Project and the New Green Island Bridge, but these impacts have not yet been quantified. All riparian mitigation required for the Downtown Guadalupe River Project has been planted 1–3 years before implementation of project components that would result in approximately 50% of the impacts. The Upper Guadalupe River Project includes establishment of 65% of the proposed riparian forest mitigation before 4% of the impacts occur. The Proposed Project also recommends mitigation of the loss of riparian vegetation from construction of flood-control structures (floodwalls and levees) and vegetation and sediment management. No riparian vegetation loss would result from cumulative flood flows of 520 cms (18,350 cfs) being contained in the channel, because this flow would occur infrequently and the Proposed Project has incorporated channel hardening at bridges and in other areas where channel velocities could affect the channel conditions. No additional channel hardening that could affect riparian vegetation is required under cumulative conditions. The other projects addressed in this cumulative impact analysis would also fully mitigate the impacts on riparian habitat (table 4-1). Because of the implemented and recommended mitigation of the losses of riparian habitat, no significant cumulative impacts on riparian vegetation are expected. No additional mitigation beyond what is recommended for the Proposed Project is required.

Shaded Riverine Aquatic Cover

Implementing the Proposed Project would minimize impacts on SRA cover because no construction features would be required that would affect current SRA cover on the lower Guadalupe River and only minimal SRA cover (31.7 linear meters [104 linear feet]) would be affected by vegetation management at bridge approaches and in sediment management areas. In addition, implementing the Downtown Guadalupe River Project and Upper Guadalupe River Project would provide 1,490 linear meters (4,886 linear feet) of SRA cover vegetation mitigation and 524 linear meters (1,720 linear feet) of undercut bank mitigation that has already been implemented or for which a commitment has been made. The Upper Guadalupe River Project also includes an additional 2,579 linear meters (8,462 linear feet) of SRA cover vegetation. The Downtown Guadalupe River Project would affect 2,689 linear meters (8,821 linear feet) of SRA cover vegetation and would provide approximately 5,494 linear meters (18,026 linear feet) of SRA cover vegetation mitigation. The District's Fish Ladder Construction Program affected 25 linear meters (82 linear feet) of SRA cover vegetation, which was mitigated directly upstream of the project site. The Guadalupe Creek Restoration Project would affect an estimated 73 linear meters (240 linear feet) of SRA cover vegetation.

Direct loss of SRA cover vegetation resulting from implementation of the projects discussed above would be fully mitigated and the Proposed Project would have a very minor contribution to this cumulative impact. Projects upstream of the LGRP would result in a more than doubling of the SRA cover vegetation along the Guadalupe River compared with existing conditions. The cumulative impact on the Guadalupe River of removing streamside vegetation is considered less than significant because all of the impacts have either already been mitigated or a commitment to replace habitat has been made that exceeds the amount of SRA cover lost. No additional mitigation is required.

Wetlands

Implementation of the Proposed Project would contribute to cumulative impacts on wetlands in the Guadalupe River; however, the Proposed Project and upstream Guadalupe River projects either have mitigated or would be required to mitigate the temporary and permanent wetland losses from construction of flood-control structures. The Proposed Project could affect 19.82 hectares (48.98 acres) of jurisdictional wetlands (refer to the "Vegetation" section in chapter 3). Most of the LGRP effects would be from required sediment and vegetation management activities. The Downtown Guadalupe River Project would not affect jurisdictional wetlands. The Guadalupe Creek Restoration Project and the Upper Guadalupe River Project would result in impacts on 0.49 hectare (1.23 acres) and 0.59 hectare (1.47 acres) of jurisdictional wetlands, respectively. The wetlands that would be affected by these projects are riverine wetlands.

The potential for significant cumulative impacts on wetlands on the Guadalupe River would be reduced to a less-than-significant level because impacts on wetlands have been or would be fully mitigated on at least a 1:1 basis. Specifically, the LGRP impacts on approximately 19.82 hectares (48.98 acres) of wetlands (construction impacts of 1.2 hectare [2.98 acres] and maintenance impacts of 18.62 hectares [46.0 acres]) would be mitigated by compensating for this loss at an off-site location or contributing to a mitigation bank. In addition, the District's SMP would provide for a portion of the wetland mitigation associated in routine channel maintenance that is required in the lower Guadalupe River. Please refer to the "Vegetation" section in chapter 3. Cumulative flood flow conditions of 520 cms (18,350 cfs) would have no impact on wetland vegetation because flood flows would be infrequent and no new flood protection features beyond those recommended for the Proposed Project would be required in areas where wetland vegetation impacts could occur.

Alviso Slough Salt Marsh and Wetlands

Construction of the Proposed Project and other cumulative projects would result in the loss of vegetation downstream and in the vicinity of the UPRR bridge. As indicated in the "Vegetation" section of chapter 3, this loss would be fully mitigated. In addition, no other construction activities, separate from the LGRP, are expected to occur within Alviso Slough that would affect vegetation. The temporary loss of vegetation would not be considered a significant cumulative impact because the loss would be short-term and would not contribute to a regional long-term loss of salt marsh or wetland vegetation. The Proposed Project with the Baylands Mitigation Measure in place would result in minor amounts of wetland vegetation removal at the Pond A8W inlet weir and associated with vegetation management and maintenance access downstream of the UPRR. Loss of wetland vegetation would be mitigated in the District's Pond A4.

Operation of the LGRP under cumulative flow conditions of 520 cms (18,350 cfs) would affect the depth and duration that vegetation within Alviso Slough is inundated; however, as indicated in the "Hydrologic and Hydraulic Conditions" section of chapter 3, a change in the depth and duration that vegetation within Alviso Slough would be inundated compared to existing conditions would only occur during major flood events. These events would be infrequent and are not expected to adversely affect vegetation. The LGRP is not expected to result in a cumulative operation-related impact on vegetation because no other changes in the hydrologic characteristics of Alviso Slough attributable to other projects are expected. In addition, flooding in Pond A6 up to approximately 1.0 meter (3.25 feet) could have temporary impacts on wetland vegetation but these potential impacts are considered minor and Pond A6 would be pumped following flood events. Please refer to Mitigation Measure HH-3.

Wildlife

The cumulative impact of disturbance to wildlife resulting from human activities on the Guadalupe River, including the Proposed Project, is considered less than significant because flood-control projects are or would be required to replace lost wildlife habitat as indicated under "Vegetation" above. Wildlife that use the Guadalupe River are already subjected to substantial disturbance from recreational use and urban activities adjacent to the river, and urban and recreational disturbances would increase even in the absence of the major cumulative projects. In addition, the proposed recreational trails would help to concentrate recreational use in specific corridors that are outside wildlife habitat areas. No special-status wildlife species would be affected by cumulative projects on the Guadalupe River because suitable habitat for special-status wildlife species is not available on the Guadalupe River. No mitigation is required.

Alviso Baylands Wildlife

No cumulative impacts on wildlife in the Alviso baylands area are expected because no other projects (in addition to the Proposed Project) that could contribute to direct or indirect cumulative wildlife impacts in this area have been identified. USFWS has indicated that it intends to restore the wildlife refuge in Pond A6 to salt marsh. Under cumulative conditions, this option would not be precluded. The breeding birds currently using Pond A6 presumably would relocate, possibly into Ponds A8, A8D, A5, or A7. Mitigation measures already in place to protect breeding snowy plovers would accommodate any shifts or expansions in the colonies currently breeding in Pond A6.

Additionally, while much of the Baylands area is currently owned by Cargill, Cargill is in discussions with various parties regarding potential transfer of ownership to the USFWS Refuge. The Refuge has indicated an interest in short-term management of the ponds for wildlife purposes and an interest in long-term tidal restoration of much of the area. The Proposed Project and associated mitigation measures would not interfere with the short-term management of the ponds for wildlife. If needed, adjustments in the pumping schedule could be made, but this necessity is unlikely. Tidal restoration of large portions of the Baylands mitigation area could also be accommodated, although more detailed studies would need to be conducted.

~~This future planned action is expected to have a beneficial impact on bayland wildlife and would not contribute to cumulative impacts.~~

Fisheries

The cumulative impacts of hydrological, geomorphological, and water quality changes on fish, including special-status anadromous species, are considered less than significant because flood protection projects on the Guadalupe River have been designed to ensure that fish migration, spawning, and rearing would not be substantially affected, and because other cumulative projects that could affect the river channel (i.e., bridge crossing projects) would be required to avoid or mitigate fish habitat and vegetation effects. The contribution of the Proposed Project to cumulative impacts on fisheries in the Guadalupe River is less than significant because implementing the Proposed Project and other cumulative projects would not require changes to the low-flow channel that could affect fisheries resources. No mitigation is required.

Alviso Baylands Fisheries

Cumulative impacts of an 520 cms (18,350 cfs) flood flow on fisheries within Alviso Slough are considered less than significant because changes in the hydrologic conditions of Alviso Slough would only occur during a major flood event. As indicated in the "Fisheries" section of chapter 3, these higher flows are not expected to adversely affect fish habitat because they would be of short duration and infrequent. The LGRP is not expected to result in a cumulative operation-related impact on fish or fish habitat within Alviso Slough because no other changes in the hydrologic characteristics of Alviso Slough attributable to other projects are expected.

Cultural Resources

The cumulative~~ impacts of~~ projects and cumulative flood flows on or near the Guadalupe River would not result in significant cumulative impacts on prehistoric or historic archaeological resources because upstream projects would either mitigate the potential impacts or would not contribute to the cumulative loss of known historic or prehistoric cultural resources. The Proposed Project could contribute to cumulative impacts on cultural resources if excavations on back sides of levees are required for constructing floodwalls or raising levees in areas known to contain sensitive buried resources, or if sensitive cultural resources are found at the SR 237 bridge crossing. This potential cumulative impact is considered less than significant because mitigation required for the Proposed Project would be implemented to reduce impacts on cultural resources and other cumulative projects would be subject to similar measures. No impacts on significant cultural or historic resources would result from a cumulative flood flow of 520 cms (18,350 cfs) because this flow would be accommodated by LGRP project elements and no significant cultural or historic resources that could be affected by infrequent flood flows exist in the Baylands area.

Other Resource Areas

No cumulative impacts would be expected for hazardous materials, land use and planning, recreation, public access and aesthetics, public services and utilities, transportation, air quality, or noise because cumulative projects and flood flows would be or have been required to mitigate impacts on these resources. No mitigation is required.

Chapter 5

Other Required Impact Analyses

Relationship between Short-Term Uses of the Environment and the Maintenance and Enhancement of Long-Term Productivity

Short-term uses of the environment that would result from construction of either LGRP action alternative and that would narrow the range of beneficial uses of the environment include impacts on existing riparian, SRA cover, and wetland vegetation, as well as impacts from other construction-related activities. In the long term, off-site mitigation to re-create these habitat types would offset the loss of riparian and SRA cover vegetation and enhance the long-term productivity of the Guadalupe River watershed. Other short-term environmental impacts associated with LGRP construction activities, such as reduced air quality and increased noise and traffic, would take place only during the construction phase and would not affect the environment's long-term productivity.

Irreversible or Irretrievable Commitments of Resources

The LGRP action alternatives would result in the irretrievable commitment of

- fossil fuels;
- other energy resources needed to construct levees, floodwalls, and channel bank modifications, relocate utilities, and replace or bypass the SR 237 bridge; and
- construction materials.

The Proposed Action or Channel Bank Modification Alternative would be a permanent fixture and would be an irreversible change in land use. The

LGRP action alternatives would be contained within the existing ROWs and would not be incompatible with either urban or open-space uses of the surrounding area. Proposed recreation facilities would also result in an irreversible change in land use along the lower Guadalupe River. The proposed LGRP recreation facilities are consistent with long-term plans to provide a pedestrian corridor along the Guadalupe River Park that extends from San Francisco Bay to downtown San Jose; therefore, they constitute an anticipated change in land use.

Growth-Inducing Impacts

The cities of San Jose and Santa Clara and the town of Alviso, adjacent to the Guadalupe River, are almost completely developed. Although there are currently vacant parcels, these areas are zoned for development and within the existing urban boundaries. Urban growth in the LGRP area is not currently restricted by the potential for flooding. Implementation of the LGRP is not expected to remove a significant restraint to growth.

Executive Order 12898—Environmental Justice

Executive Order 12898: *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations* requires each federal agency to identify and address any disproportionately high and adverse human health or environmental effects of its actions on minority and low-income populations.

In-channel flood protection improvements associated with the LGRP would not be located in minority or low-income areas or communities. Similarly, construction of the LGRP would only disturb lands that are within the existing District or Caltrans ROWs, which are adjacent primarily to commercial properties. However, implementation of the LGRP could affect areas that are populated and developed. As described in chapter 3, "Affected Environment and Environmental Consequences," the LGRP could induce flooding in Alviso.

The population of Santa Clara County is very diverse; according to the 2000 Census, the major ethnic groups are white, 44%; Asian, 25%; and Hispanic, 23%. The census data show that a somewhat larger proportion of the population in San Jose is nonwhite than in the county as a whole (white, 36%; Hispanic, 30%; Asian, 26%). A somewhat smaller proportion of the population in Santa Clara is nonwhite than in the county as a whole (white, 48%; Asian, 29%; Hispanic, 16%). Census 2000 data specific to Alviso indicate that the population is predominantly Hispanic; 75% reported Hispanic or Latino origin.

Therefore, the LGRP could disproportionately affect minority or low-income populations or communities downstream of the project area, if these areas were compared to San Jose and Santa Clara or to Santa Clara County as a whole.

Chapter 6

Agency and Public Involvement

Public Involvement

The public involvement effort of the LGRP demonstrates a comprehensive and proactive approach to inviting and responding to comments from public-interest groups related to the project. Input from members of the public and from interested organizations and agencies was an essential component in the development and screening of the Proposed Action and alternatives and in scoping for this EIR. (*Scoping* refers to the process used to identify the range of project alternatives and mitigation measures to be analyzed in depth, establish methods of assessment, and select the environmental effects to be considered in detail.) Tools used in scoping for the LGRP include

- early public and interagency consultation,
- early open house meetings to present possible project alternatives and analysis results,
- a scoping meeting and NOP/Notice of Intent (NOI) process, and
- a site visit by an agency representative and roundtable discussions of project issues and alternatives.

Community Assessment

The early stages of the public involvement effort required that the District conduct one-on-one interviews with a group of stakeholders representing civic associations, minority ethnic communities, business associations, environmental organizations, homeowners, and local governments. The interviews addressed specific questions surrounding the issues of:

- District awareness,
- experience with flooding,
- benefits and issues affecting the LGRP, and
- appropriate outreach methods.

The interviews resulted in detailed explanations of the concerns, issues, and challenges related to flood protection for the community surrounding the lower Guadalupe River. Those interviewed provided additional insight into important contacts, methods for community outreach/education, and project challenges. The following challenges were identified:

- diverging views about project objectives;
- distrust of government officials;
- objectives beyond the project scope;
- constraints on the project's schedule and funding;
- communication barriers (e.g., local residents speak multiple languages);
- the need to gain the public's attention;
- the need to obtain access to business representatives; and
- the ability to coordinate convenient public meetings.

Based on the challenges identified, the District drafted a set of public-involvement goals and a set of specific activities and tools to ensure that those goals were met. The activities educated the public about the project and granted them sufficient opportunity to provide input during the selection, design, and construction stages of the LGRP.

Activities and Tools

The following list outlines each public involvement task and summarizes the public's response.

Update Agency Stakeholders through the Watershed Management Initiative Flood Management Subgroup

Regulatory agencies were updated about project issues and, using the Watershed Management Initiative (WMI) forum, tested the acceptability of the preferred alternative in the development stages. The WMI identified significant issues pertaining to the dredging alternative and aggressive vegetation management.

Conduct Individual and Customized Stakeholder Meetings

Customized presentations explaining the project were shown to the stakeholders. The District held presentations for and/or meetings with the following groups:

- Mujer Latina Discussion Group (January 20, 2000);
- the Alviso Rotary Club (July 12, 2000);
- the Santa Clara Valley Manufacturing Group—Environmental Subgroup (several meetings in 2000) (see Engineer's Report);
- the Peninsula Industry and Business Association (several in 2000) (see Engineer's Report);
- the Coyote Guadalupe Resource Conservation District (February 28, 2000; July 17, 2000);
- San Jose International Airport;
- various government agencies;
- Valley Transportation Authority;
- Santa Clara County Department of Parks and Recreation; and
- Downtown Collaborative (April 13, 2000; July 27, 2000).

The concerns represented ranged from construction impacts/noise and intergovernmental coordination to the loss of fish habitat.

Hold Public Meetings

Public meetings provided an informal forum in which community members could receive project information, ask questions, and express concerns. Community meetings were conducted in an open-house format and at convenient public locations along the lower Guadalupe River corridor. In addition to the formal scoping meetings and 2 public hearings required to meet the needs of NEPA and CEQA, the District decided to hold additional outreach meetings and activities.

The initial open house to introduce the project was held January 27, 2000, in Alviso. An average of 30–50 participants, many of whom were residents of the project area, attended the public meetings. The major concerns captured through the meeting process were:

- protection of property interests,
- environmental concerns,

- health and safety,
- river maintenance, and
- recreational opportunities.

Prepare and Maintain Stakeholder Matrix

Using the District's GIS equipment, a project-specific mailing matrix was developed. The matrix encompassed the entire floodzone affected by the lower Guadalupe River. Information was mailed to everyone on the list; 2% of the respondees wished to continue receiving project information. For the required public meetings, a new matrix was created for those living within 304 m (1,000 feet) of the project area. To ensure that all interested members of the public were included, ongoing additions and deletions were completed after each mailing and public meeting.

Operate Project Hotline

The District's 24-hour phone message line provided convenient customer service for project-related questions. The hotline received the majority of calls before and after the public meetings as callers requested information and indicated that they would attend the meetings.

Send Updates to Special-Interest Newsletters and Email Lists

Written updates were sent to government agencies and environmental and civic groups for inclusion in their newsletters and email distributions. The updates included discussions of important project issues and listed upcoming meetings. As a result of this effort, individual groups requested presentations on the project.

Distribute Project Newsletters

Written project updates were provided to interested members of the public included in the mailing matrix and at identified distribution locations. The project newsletters were prepared in English and Spanish and included valuable information on opportunities for public comments and other involvement, public concerns, project progress, and study results. The newsletter was distributed as important project events were planned. Additional project newsletters were requested and were supplied to public agencies and civic groups.

Maintain Project Website

The website provided easy public access to information about the project's background, meeting summaries, and upcoming events. Several requests were received for the website address. Information requests and questions also came in by way of the email link on the project website.

Create PowerPoint™ Presentation

An adaptable PowerPoint presentation of the project planning process, alternatives, and evaluation results was created. The presentation was designed to be flexible and adaptable for different stakeholder meetings and group presentations. Throughout the life of the project, a considerable number of presentations will be provided to civic, environmental, governmental, and other interested parties. The Guadalupe Coyote Resource Conservation District (GCRCD), Downtown Collaborative, Alviso Rotary Club, and Santa Clara County are a few examples of presentation recipients.

The PowerPoint presentation served to create interest in the project and initiate questions at public presentations. In addition, the District regularly published and mailed newsletters that updated interested organizations and the public on LGRP progress, scoping activities, and alternatives development. The District also conducted a detailed alternatives screening process to identify alternatives that would be addressed in the EIR (see chapter 2).

Agency Involvement

On April 19, 2000, the District issued an NOP to inform agencies and the public that an EIR was being prepared, and to invite comments on the document's scope and content and participation at a public scoping meeting. The NOP was published in both English and Spanish and mailed to people who live in the vicinity of the lower Guadalupe River, regulatory and public officials, and representatives of interested stakeholders. In addition, the Corps issued an NOI, which was published in the *Federal Register* on April 21, 2000, because of a previous approach to prepare a combined EIR/EIS.

On May 3, 2000, the District held a public scoping meeting to solicit agency and public comments to determine the scope of the EIR. More than 30 people from both the public and private sectors attended the scoping meeting. Attendees were given an overview of the meeting's purpose, proposed project and alternatives, and potentially significant environmental issues.

As a result of the public scoping process, the District prepared a scoping report that documented comments received during the public scoping meeting and summarized the types of comments. Twelve comment letters were received during the NOP/NOI process.

In addition to scoping meetings, the District has conducted 3 interagency coordination meetings to present the project alternatives and preliminary impact analyses. Agency meetings were held with staff representatives from the Corps, USFWS, NMFS, EPA, DFG, and the SFBRWQCB.

Areas of Known Controversy

Based on comments from the public meetings and the scoping meeting, several concerns must still be resolved (see also table 6-1):

- downstream Guadalupe River–induced flooding problems;
- effects on biological resources, such as changes in lower Guadalupe River habitat and the balance between the need for flood protection and protection of the corridor's environmental values;
- effects of the LGRP on recreation and the Alviso Marina;
- potential impacts on sensitive archaeological or historic resources; and
- the need for timely construction of flood protection features (i.e., such features must be in place before the downtown Guadalupe River Project is implemented).

The District has attempted to respond to these areas of controversy by proposing only alternatives for the LGRP that could minimize effects on in-channel fish and wildlife habitat and largely avoid construction in or near the low-flow channel. There may still be potential conflicts with objectives related to enhancing biological resources and the need for long-term management of vegetation and sediment in the lower Guadalupe River. The risk of induced flooding downstream in Alviso, the Cargill Salt Ponds, and the USFWS wildlife refuge has been addressed with the proposed Baylands Mitigation Measure (refer to "Hydrology and Hydraulic Conditions" in chapter 3).

To address potential recreation effects at the Alviso Marina, a relatively small levee from the UPRR crossing to the marina has been proposed as 1 element of the Baylands Mitigation Measure; such a levee could minimize

Table 6-1. Stakeholder Comments on Relevant Project Issues

Topic of Concern	Stakeholder		
	Residents and Civic Organizations	**Environmental Groups and Agencies**	**Commercial Interests and Organizations**
Property Interests	Prevention of residential property damage is a serious concern. Improved sewer and storm drainage systems are also necessary. Lowering the cost of flood insurance is important.	The setback levee option should be investigated even if additional right-of-way must be obtained. There is an assumption that the salt pond easements or property will be obtained and the ponds will be restored to the natural baylands habitat.	Coordination with businesses is critical to ensure facilities are not damaged during construction or as a result of the project improvements. Temporary traffic and construction annoyances are acceptable; however, long-term disruption or worsening of traffic problems is not. The project must provide additional security and protection for businesses against flooding, the disruption of future business activity, and the protection of valuable inventory.
Environmental Concerns	Potential contamination by mercury and heavy metals in the river sediment. Ensure that impacts to fish and wildlife are appropriately addressed. Coordinate with other products in the watershed.	Special-status species must be considered for each alternative. Floodplain restoration should be investigated as the preferred alternative. Destroying and damaging existing fish and wildlife habitat, river temperature, and vegetation is a primary concern. The river serves a larger purpose in the environment and wildlife habitat and is not only a drainage mechanism.	Many businesses in the area would support environmental issues due to the positive impacts on quality of life for employees.

Table 6-1. Continued.

Topic of Concern	Stakeholder		
	Residents and Civic Organizations	**Environmental Groups and Agencies**	**Commercial Interests and Organizations**
Health and Safety	Emergency preparedness to ensure personal health and safety, as well as the safety of local children is critical.	Mercury hot spots should be identified through the environmental permitting process and opportunities to intercept mercury throughout the project should be investigated.	Increased quality of life as a result of the project is beneficial to the attraction and retention of workers.
Maintenance	Vegetation needs to be removed to allow views of the water. Sediment must be removed from the river. Garbage should be regularly removed. The life span of the project's improvement must be seriously considered. Dredging is an important alternative.	The extent of vegetation management to be conducted under each alternative is of concern. The cost of maintenance requirements should be provided for each alternative. Channels should be designed to transport sediments naturally.	Impacts on adjacent business for long-term maintenance is an issue.
Recreation and Aesthetic Enhancements	Positive aesthetic enhancements can increase adjacent property values. Public access brings concerns of crime and loitering. Views of the river are important. Residents expect that access to the river and levee trails will continue and be enhanced.	Recreational enhancements should not be at the detriment to fish and wildlife habitat. Connections, coordination, and compliance with existing trails and planned trails are imperative.	Employees enjoy recreational enhancements along the river for exercise and lunch.

Table 6-1. Continued.

Topic of Concern	Stakeholder		
	Residents and Civic Organizations	**Environmental Groups and Agencies**	**Commercial Interests and Organizations**
Alternatives	Transferring water to the bay and adding more concrete to increase river flows will cause Alviso to continue to flood. Dredging only to the UPRR may put people in Alviso at greater risk. Increased levee size would block views and access to the river. Do not add more pumped flows into the river. The capacity of the river must be increased to handle the 100-year flood flows. The chosen alternative should represent the least impact to the natural habitats, which include preserving riparian vegetation and setting back levees as far as possible.	Water quality impacts, sediment sampling (mercury), and impacts to shaded riparian areas must be investigated and properly mitigated for any alternative. The ability to satisfy all regulatory requirements is critical. There is support for a restorative approach as opposed to hardscaping. Significant issues should be addressed, such as the use of appropriate stabilization materials (native grasses), establishing a larger floodplain through land acquisition, sediment removal, and avoidance of flood wall usage to minimize erosion.	The alternative that provides a combination of enhanced flood protection, quality of life, and is completed with the least impact to area businesses is preferred.

impacts on recreation in this area, compared to impacts that could result from a much larger levee.

In addition, excavation required under the Proposed Action has been minimized by proposing floodwall construction on levees and levee raising that would minimize impacts on buried archaeological resources. The Proposed Action has also attempted to provide the simplest flood-control solution possible to ensure that the LGRP is constructed before upstream flood-control projects begin operation.

Chapter 7

Mitigation and Monitoring Plan Summary

Introduction

This section provides a summary of the mitigation and monitoring plan (MMP) that is being prepared to avoid, minimize, or compensate for impacts on resources from the LGRP. The MMP is being prepared in response to CEQA and regulatory agency requirements associated with mitigation of project-related adverse effects on the environment. The MMP will be used to ensure that mitigation would

- be adequate to ensure that the LGRP causes no significant adverse effects on environmental resources;
- fulfill the requirements stipulated in project permits and authorizing documents; and
- be in compliance with laws that govern adverse effects on environmental quality and with the legal instruments implementing those laws.

The MMP identifies and describes LGRP environmental commitments that would ensure the protection of environmental resources present in the project area. Unavoidable damages to resources must be rectified by repairing, rehabilitating, or restoring the affected resources. Damages to resources that cannot be repaired, rehabilitated, or restored must be compensated for by replacing them or providing substitute resources or environments. Substitute resources, on the balance, need to be at least equal in value and significance to the resources lost.

Environmental Commitments to Avoid and Minimize Adverse Project Effects during Construction and Operation of the LGRP

Under the LGRP action alternatives, environmental commitments (preventive measures) would be implemented to avoid and minimize potential adverse effects on sensitive resources, including riparian and wetland vegetation, and on aquatic resources and wildlife during construction. Environmental commitments are also included to reduce construction nuisances and disruptions on nearby residences and businesses and on the transportation system. These environmental commitments, described in chapter 2, include

- a vegetation protection plan,
- a SWPPP,
- an erosion and sediment control plan,
- a spill prevention and response plan,
- a soil management plan,
- a hazardous and toxic materials contingency plan,
- a construction-area fish management program,
- construction period limits,
- measures to comply with the Migratory Bird Treaty Act,
- measures to implement BAAQMD's feasible control measures for PM10 emissions from soil removal activities,
- a traffic control plan,
- a cultural resources management plan,
- contact with service providers before construction, and
- noise-reducing construction practices.

The requirements associated with these environmental commitments would be included in the construction contractor's plans and specifications. The environmental commitments are identified and described in their respective resource areas of the MMP.

Additional Mitigation Measures to Avoid, Minimize, or Compensate for Adverse Project Effects during Construction and Operation of the LGRP

Additional mitigation measures, as needed, to reduce project impacts to less-than-significant levels are described in the MMP. These additional measures include structural features to minimize flooding in Alviso, minimize hydraulic effects on Alviso Slough, and minimize effects on Cargill's salt production facilities in the baylands. They also include compensatory measures to replace wetland and riparian habitats that would be disturbed by construction and maintenance operations.

For each resource area discussed in the EIR, the MMP identifies the LGRP impacts, mitigation objectives, environmental commitments, additional mitigation measures, location of measures, monitoring and reporting requirements, timeframe for implementing the measures, and the entity responsible for implementing the mitigation measures. Table 7-1 summarizes the MMP.

Table 7-1. Mitigation and Monitoring Plan Summary

Impact	Mitigation Objective	Environmental Commitments	Mitigation Measures	Location	Mitigation Monitoring and Reporting Requirements	When Mitigation will be Implemented	Responsible Entity
Hydrologic and Hydraulic Conditions							
Potential for Flooding Induced by the LGRP	Reduce contribution of Guadalupe River to flooding problems in Alviso and minimize effects on Cargill Salt operations	None	HH-1: Construct West-Perimeter Levee Around Alviso	East bank of Alviso Slough from UPRR to northeast corner of the marina	NA	Before operation of the Corps' Guadalupe River Project	District
			HH-2: Construct Alviso Slough Overflow Weir and Harden Pond A6 Levee	Immediately across from Alviso in natural low spot in Cargill levee	NA	Before operation of the Corps' Guadalupe River Project	District
			HH-3: Pump Cargill Salt Ponds	Cargill Salt Ponds A5, A7, A8D, and A8W	Operate, maintain, and report in accordance with O&M plan	As needed following flooding in Cargill ponds	District
			HH-4: Manage Vegetation in Alviso Slough from UPRR Downstream to Overflow Weir	East bank of Alviso Slough from UPRR to opposite the overflow weir	Operate, maintain, and report in accordance with O&M plan	Ongoing maintenance activity to allow proper channel function during flood events and ensure function of overflow weir	District
Geomorphology and Geologic Hazards							
No Significant Impacts Identified	NA	NA	NA	NA	NA	NA	NA
Water Quality							
Potential Release of Sediment or Sediment-Borne Pollutants during Construction	Minimize potential for releases of pollutants to the river by limiting construction to low-flow periods, implementing standard good house-keeping measures, removing mercury-laden soil from the watershed for disposal, and complying with regulatory requirements	Stormwater pollution prevention plan	No additional measures identified	Construction area	Monitor and report to RWQCB per permit requirements - copy District	District will monitor before construction to ensure that the SWPPP has been included in construction plans as per Bid Specifications. Must be submitted to the RWQCB before construction and must be posted on-site	District/ Contractor
		Erosion and sediment control plan		Construction area	NA	District will monitor before construction to ensure that the erosion and sediment control plan has been included in construction plans as per Bid Specifications	District
		Spill prevention and response plan		Construction area	Immediately report occurrences to RWQCB, DFG, and District	District will monitor before construction to ensure that the spill prevention and response plan has been included in construction plans as per Bid Specifications	District
		Soil management plan		Construction area	Report to RWQCB	District will monitor before construction to ensure that the soil management plan has been included in construction plans as per Bid Specifications	District

Water Quality (continued)

Table 7-1. Continued

Impact	Mitigation Objective	Environmental Commitments	Mitigation Measures	Location	Mitigation Monitoring and Reporting Requirements	When Mitigation will be Implemented	Responsible Entity
		Hazardous and toxic materials contingency plan		Construction area	Immediately report occurrences to RWQCB and District	District will monitor before construction to ensure that hazardous and toxic materials contingency plan has been included in construction plans as per Bid Specifications	District
		Construction period limits		Construction area	NA	In-channel construction would be limited to the summer low-precipitation period (April 15–October 15). Construction period limits will be specified in Bid Specifications	District
Potential for Accidental Spills of Construction Materials	Minimize potential for accidental spills by implementing standard BMPs and complying with regulatory requirements	Stormwater pollution prevention plan	No additional measures identified	Construction area	Monitor and report to RWQCB per permit requirements - copy District	District will monitor before construction to ensure that all environmental commitments and mitigation measures have been included in construction plans as per Bid Specifications. Must be submitted to the RWQCB before construction and must be posted on-site	District/ Contractor
		Spill prevention and response plan		Construction area	Immediately report occurrences to RWQCB, DFG, and District	District will monitor before construction to ensure that all environmental commitments and mitigation measures have been included in construction plans as per Bid Specifications	District
Potential Degradation of Water Quality as a Result of Vegetation and Sediment Management	Minimize potential for releases of pollutants to the river by limiting construction to low-flow periods, implementing standard good housekeeping measures, removing mercury-laden soil from the watershed for disposal, and complying with regulatory requirements	Stormwater pollution prevention plan	No additional measures identified	Construction area	Monitor and report to RWQCB per permit requirements - copy District	District will monitor before construction to ensure that the SWPPP has been included in construction plans as per Bid Specifications. Must be submitted to the RWQCB before construction and must be posted on-site	District/ Contractor
		Spill prevention and response plan		Construction area	Immediately report occurrences to RWQCB, DFG, and District	District will monitor before construction to ensure that the erosion and sediment control plan has been included in construction plans as per Bid Specifications	District
		Soil management plan		Construction area	Report to RWQCB	District will monitor before construction to ensure that the spill prevention and response plan has been included in construction plans as per Bid Specifications	District
		Hazardous and toxic materials contingency plan		Construction area	Immediately report occurrences to RWQCB and District	District will monitor before construction to ensure that the hazardous materials and toxic contingency plan has been included in construction plans as per Bid Specifications	District
		Construction period limits		Construction area	Monitor and report in accordance with O&M plan		District

Table 7-1. Continued

Impact	Mitigation Objective	Environmental Commitments	Mitigation Measures	Location	Mitigation Monitoring and Reporting Requirements	When Mitigation will be Implemented	Responsible Entity
Water Quality (continued)							
Potential Discharge or Mobilization of Mercury	Minimize potential for releases of pollutants to the river by limiting construction to low-flow periods, implementing standard BMPs, and removing mercury-laden soil from the watershed for disposal	Erosion and sediment control plan	No additional measures identified	Construction area	NA	District will monitor before construction to ensure that hazardous and toxic materials contingency plan has been included in construction plans as per Bid Specifications	District
		Soil management plan		Construction area	Report to RWQCB	In-channel construction would be limited to the summer low-precipitation period (April 15–October 15) construction period limits will be specified in Bid Specifications	District
	Minimize the potential for methyl mercury formation by removing contaminated materials as necessary	Soil management plan	No additional measures identified.	Cargill salt Ponds A5, A7, A8D, and A8W	Report to RWQCB	During construction of pond A8W overflow weir	District
Hazards and Hazardous Materials							
Construction Activities Affected by Exposure to Contaminated Soils		Hazardous and toxic materials contingency plan	No additional measures identified	Construction area	Immediately report occurrences to RWQCB and District	District will monitor before construction to ensure that a hazardous and toxic materials contingency plan have been included in construction plans as per Bid Specifications	District
		Soil management plan		Construction area	Report to RWQCB	District will monitor before construction to ensure that all environmental commitments and mitigation measures have been included in construction plans as per Bid Specifications	District
Construction Activities Affected by Contaminated Groundwater		Soil management plan	No additional measures identified	Construction area	Report to RWQCB	District will monitor before construction to ensure that all environmental commitments and mitigation measures have been included in construction plans as per Bid Specifications	District

Table 7-1. Continued

Impact	Mitigation Objective	Environmental Commitments	Mitigation Measures	Location	Mitigation Monitoring and Reporting Requirements	When Mitigation will be Implemented	Responsible Entity
Vegetation							
Potential for Loss of Riparian (4.65 ac.), Wetland (48.98 ac.), and Ruderal (83.15 ac.) Vegetation from Construction and Vegetation and Sediment Management	Minimize habitat disturbance through project design and vegetation protection plan. Mitigate riparian impacts through on-site plantings and undesirable-species replacement. Mitigate tidal wetlands with in-kind replacement in Districts salt pond A4 restoration site. Mitigate nontidal wetlands impacts with out-of-kind replacement in District's salt pond site. Ruderal impacts, although not significant, will be minimized by implementing erosion and sediment control plan	Vegetation protection plan	V-1: Replace or Compensate for Riparian and Wetland Habitat		NA	Riparian vegetation will be planted in reach A no later than end of 2003. Wetland mitigation will in Pond A4 in 2007	District
		Erosion and sediment control plan	Riparian: in-kind at 0.5:1 ratio	Reach A	Monitor riparian plantings for survival and density for 5 years, replace as needed to maintain 75% survival per year and at least 50% cover by the end of the monitoring period. Annual monitoring report to USFWS, NMFS, and DFG	2003	
			Wetland-tidal freshwater marsh: in kind @ 1:1 ratio	District's Pond A4	Fund prorated (±10%) share of monitoring costs specified for restoration project. Annual monitoring report to USFWS, NMFS, Corps, and DFG	2007	
			Wetland - freshwater marsh: out-of-kind @ 2:1 ratio	District's Pond A4	Fund prorated share of restoration project monitoring costs. Annual monitoring report to USFWS, NMFS, Corps, and DFG	2007	
Vegetation (continued)							

Table 7-1. Continued

Impact	Mitigation Objective	Environmental Commitments	Mitigation Measures	Location	Mitigation Monitoring and Reporting Requirements	When Mitigation will be Implemented	Responsible Entity
Potential for Impacts on Tidal Salt Marsh, Diked Salt Marsh, Brackish Marsh, and Freshwater Marsh from Implementing the Baylands Mitigation Measure	Minimize impacts on habitat by restoring marsh habitat in pond A4		V-2: Replace or compensate for riparian wetland habitat. Additional mitigation will be provided to include wetland impacts from Baylands Mitigation Measure	District's Pond A4	Annual monitoring report to USFWS, NMFS, Corps, and DFG	2007	District
Wildlife							
Potential for Adverse Effects on Common Wildlife Species Associated with Riparian, Wetland, and Upland Habitat Loss	Minimize impacts on wildlife by replacing habitats and limiting disturbance through critical life stages by limiting construction and maintenance periods	Construction period limits	V-1: Replace or Compensate for Riparian and Wetland Habitat	Project site and District's Pond A4	Annual monitoring report to USFWS, NMFS, Corps, and DFG	Riparian and wetland habitat will be replaced by end of 2003 and 2007, respectively	District
			W-1: Avoid Nesting Raptors and Birds During Construction and Maintenance	Construction and vegetation and sediment management	NA	Before construction	District
Potential for Impacts on Western Snowy Plover	Avoid loss of breeding season in pond A8D	None	HH-3: Pump Cargill Salt Ponds	Pond A8D	Monitoring report to USFWS and DFG following flooding event	Following storms that flood pond A8D and coordinated with downtown Guadalupe River requirement to pump Pond A8D	District
Potential for Impacts on Nesting Raptors, including Burrowing Owls	Avoid construction impacts on nesting burrowing owls	None	W-1: Avoid Nesting Raptors and Birds During Construction and Maintenance		Monitoring report sent to DFG before construction begins	Before construction begins on overflow weir and Alviso levee	District
Fisheries							
Potential for Changes in Fish Habitat from the Construction of Floodwalls, Levees, and Other Structures	Minimize impacts on fisheries by preventing degradation of water quality	Stormwater pollution prevention plan	No additional measures identified	Construction area	Monitor and report to RWQCB per permit requirements - copy District	District will monitor before construction to ensure that all environmental commitments and mitigation measures have been included in construction plans as per Bid Specifications	District/ Contractor

Fisheries (continued)

Table 7-1. Continued

Impact	Mitigation Objective	Environmental Commitments	Mitigation Measures	Location	Mitigation Monitoring and Reporting Requirements	When Mitigation will be Implemented	Responsible Entity
		Erosion and sediment control plan		Construction area	NA	District will monitor before construction to ensure that all environmental commitments and mitigation measures have been included in construction plans as per Bid Specifications	District
		Spill prevention and response plan		Construction area	Immediately report occurrences to RWQCB, DFG, and District	District will monitor before construction to ensure that all environmental commitments and mitigation measures have been included in construction plans as per Bid Specifications	District
		Hazardous and toxic materials contingency plan		Construction area	Immediately report occurrences to RWQCB and District	District will monitor before construction to ensure that all environmental commitments and mitigation measures have been included in construction plans as per Bid Specifications	District
		Construction period limits		Construction area	NA	District will monitor before construction to ensure that all environmental commitments and mitigation measures have been included in construction plans as per Bid Specifications	District
Potential for Changes in Fish Habitat from the Construction of a New SR 237 Bridge	Minimize impacts on fisheries by preventing degradation of water quality	Stormwater pollution prevention plan	No additional measures identified	Construction area	Monitor and report to RWQCB per permit requirements - copy District	District will monitor before construction to ensure that all environmental commitments and mitigation measures have been included in construction plans as per Bid Specifications	District/ Contractor
		Erosion and sediment control plan		Construction area	NA	District will monitor before construction to ensure that all environmental commitments and mitigation measures have been included in construction plans as per Bid Specifications	District
		Spill prevention and response plan		Construction area	Immediately report occurrences to RWQCB, DFG, and District	District will monitor before construction to ensure that all environmental commitments and mitigation measures have been included in construction plans as per Bid Specifications	District

Table 7-1. Continued

Impact	Mitigation Objective	Environmental Commitments	Mitigation Measures	Location	Mitigation Monitoring and Reporting Requirements	When Mitigation will be Implemented	Responsible Entity
Fisheries (continued)							
		Hazardous and toxic materials contingency plan		Construction area	Immediately report occurrences to RWQCB and District	District will monitor before construction to ensure that all environmental commitments and mitigation measures have been included in construction plans as per Bid Specifications	District
		Construction area fish management program		Construction areas in or adjacent to low-flow channel	Monitor fisheries impacts and report findings to NMFS, USFWS, and DFG	District and contractor will monitor drawing construction in or near the low-flow channel	District/ Contractor
		Construction period limits		Construction area	NA	District will monitor before construction to ensure that all environmental commitments and mitigation measures have been included in construction plans as per Bid Specifications	District
Potential for Changes in Fish Habitat and Anadromous Fish Migration from the Construction and Operation of the SR 237 Bypass Option	Minimize impacts on fisheries by preventing degradation of water quality	Stormwater pollution prevention plan	No additional measures identified	Construction area	Monitor and report to RWQCB per permit requirements - copy District	District will monitor before construction to ensure that all environmental commitments and mitigation measures have been included in construction plans as per Bid Specifications	District/ Contractor
		Erosion and sediment control plan		Construction area	NA	District will monitor before construction to ensure that all environmental commitments and mitigation measures have been included in construction plans as per Bid Specifications	District
		Spill prevention and response plan		Construction area	Immediately report occurrences to RWQCB, DFG, and District	District will monitor before construction to ensure that all environmental commitments and mitigation measures have been included in construction plans as per Bid Specifications	District
		Hazardous and toxic materials contingency plan		Construction area	Immediately report occurrences to RWQCB and District	District will monitor before construction to ensure that all environmental commitments and mitigation measures have been included in construction plans as per Bid Specifications	District

Table 7-1. Continued

Impact	Mitigation Objective	Environmental Commitments	Mitigation Measures	Location	Mitigation Monitoring and Reporting Requirements	When Mitigation will be Implemented	Responsible Entity
Fisheries (continued)							
		Construction period limits		Construction area	NA	District will monitor before construction to ensure that all environmental commitments and mitigation measures have been included in construction plans as per Bid Specifications	District
		Construction area fish management program		Construction areas in or adjacent to low-flow channel	Monitor fisheries impacts and report findings to NMFS, USFWS, and DFG	District and contractor will monitor drawing construction in or near the low-flow channel	District/ Contractor
Potential for Changes in Fish Habitat and Anadromous Fish Migration from Vegetation and Sediment Management Activities in Reaches A–G	Minimize impacts on fisheries by preventing degradation of water quality and providing connections from dredged areas to main channel		F-1: Provide Fish Passage Connection to Low-Flow Channel	Sediment management areas	Annual monitoring report to USFWS, NMFS, and DFG describing corrective actions taken if needed	During project design and annually as needed to maintain connection to low-flow channel	District
		Stormwater pollution prevention plan		Sediment management areas	Monitor and report to RWQCB per permit requirements - copy District	District will monitor before construction to ensure that all environmental commitments and mitigation measures have been included in construction plans as per Bid Specifications	District/ Contractor
		Erosion and sediment control plan		Sediment management areas	NA	District will monitor before construction to ensure that all environmental commitments and mitigation measures have been included in construction plans as per Bid Specifications	District
		Spill prevention and response plan		Sediment management areas	Immediately report occurrences to RWQCB, DFG, and District	District will monitor before construction to ensure that all environmental commitments and mitigation measures have been included in construction plans as per Bid Specifications	District
		Hazardous and toxic materials contingency plan		Sediment management areas	Immediately report occurrences to RWQCB and District	District will monitor before construction to ensure that all environmental commitments and mitigation measures have been included in construction plans as per Bid Specifications	District
		Construction period limits		Sediment management areas	NA	District will monitor before construction to ensure that all environmental commitments and mitigation measures have been included in construction plans as per Bid Specifications	District

Table 7-1. Continued

Impact	Mitigation Objective	Environmental Commitments	Mitigation Measures	Location	Mitigation Monitoring and Reporting Requirements	When Mitigation will be Implemented	Responsible Entity
Land Use and Planning							
Potential for Construction-Related Nuisances from Raising the SR 237 Bridge	Minimize construction nuisances by controlling dust and noise. Minimize traffic nuisances by installing signs and limiting project activities to nonpeak traffic hours	Bay Area Air Quality Management District (BAAQMD) feasible control measures for emissions of respirable particulate matter smaller than 10 microns (PM10)	No additional measures identified	Construction area	NA	District will monitor before construction to ensure that all environmental commitments and mitigation measures have been included in construction plans as per Bid Specifications	Contractor
		Traffic safety plan		Construction area	NA	District will monitor before construction to ensure that all environmental commitments and mitigation measures have been included in construction plans as per Bid Specifications	Contractor
		Noise-reducing construction practices		Construction area	NA	District will monitor before construction to ensure that all environmental commitments and mitigation measures have been included in construction plans as per Bid Specifications	Contractor
Potential for Land Use Conflicts from Construction of SR 237 Bypass Culvert Option	Minimize safety hazards by installing guard rails and signs	None	LU-1: Install Safety Measures	SR 237	NA	Incorporate into project design	District
Recreation, Public Access, and Visual Resources							
Potential for Changes in Visual Resources and Views from Flood-Control Structures	Soften look of channel modification structures	None	RV-1: Plant vegetation after construction	Reaches D-G	None	Incorporate into project design	District

Table 7-1. Continued

Impact	Mitigation Objective	Environmental Commitments	Mitigation Measures	Location	Mitigation Monitoring and Reporting Requirements	When Mitigation will be Implemented	Responsible Entity
Transportation and Traffic							
Potential for Roadway Safety Hazards	Minimize traffic safety hazards by installing signs and limiting project- related traffic to nonpeak traffic hours	Traffic safety plan	No additional measures identified	Construction area	NA	District will monitor before construction to ensure that all environmental commitments and mitigation measures have been included in construction plans as per Bid Specifications	Contractor
Increased Delay for Traffic Traveling Across the SR 237 Bridge	Minimize traffic delays by installing signs and limiting project activities to nonpeak traffic hours	Traffic safety plan	No mitigation available to reduce to less-than-significant level	Construction area	NA	District will monitor before construction to ensure that all environmental commitments and mitigation measures have been included in construction plans as per Bid Specifications	Contractor
Air Quality							
	Minimize air quality impacts by controlling dust and ensuring equipment is in proper state of repair	BAAQMD feasible control measures for emissions of respirable particulate matter smaller than 10 microns (PM10)	No additional measures identified	Construction area	NA	District will monitor before construction to ensure that all environmental commitments and mitigation measures have been included in construction plans as per Bid Specifications	Contractor
Noise							
	Minimize noise impacts by ensuring equipment has proper mufflers and is in proper state of repair; designate a noise abatement coordinator to respond to local complaints	Noise-reducing construction practices	No additional measures identified	Construction area	NA	District will monitor before construction to ensure that all environmental commitments and mitigation measures have been included in construction plans as per Bid Specifications	District/ Contractor
Public Services and Utilities							
	Minimize potential for interruption of service by coordinating with utilities in the construction corridor	Service provider coordination before construction	No additional measures identified	Construction area	NA	District will monitor before construction to ensure that all environmental commitments and mitigation measures have been included in construction plans as per Bid Specifications	Contractor

Table 7-1. Continued

Impact	Mitigation Objective	Environmental Commitments	Mitigation Measures	Location	Mitigation Monitoring and Reporting Requirements	When Mitigation will be Implemented	Responsible Entity
Cultural Resources							
Potential for disturbance of recorded and undiscovered cultural resources in reaches A–G.	Minimize potential for impacts on cultural resources by monitoring construction activity, stopping work if potential resources are encountered, and appropriate treatment of encountered resources	Cultural resources, input avoidance measures		Excavated areas in construction area	Immediately stop work and report occurrences to County Coroner and District	Before and during LGRP excavations	District/ Contractor
			CR-1: Monitor all excavated areas		Monitor on-site during excavations report to District, Corps, and SHPO as per cultural resources PA	Before and during LGRP excavations	District
			CR-2: Avoid vibrational impacts on Alviso historic district by restricting use of pile drivers near historic structures		Monitor on-site during excavations report to District, Corps, and SHPO as per cultural resources PA	During construction	District
			CR-3: Restrict use of staging areas 5 and 10 to avoid known sites		Monitor on-site during excavations report to District, Corps, and SHPO as per cultural resources PA	During construction	District
			CR-4: Avoid impacts on CA-SCL-5		Monitor on-site during excavations report to District, Corps, and SHPO as per cultural resources PA	Before and during construction	District

Chapter 8

References Cited

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Chapter 9

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Appendix A

U.S. Army Corps of Engineers Letter on Environmental Impact Statement Requirement

(April 13, 2001)

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
333 MARKET STREET
SAN FRANCISCO, CALIFORNIA 94105-2197

REPLY TO

APR 13 2001

Regulatory Branch

SUBJECT: File Number 24897S

Mr. Dave Chesterman
Santa Clara Valley Water Discrict
5750 Almaden Expressway
San Jose, California 95118-3686

Dear Mr. Chesterman:

We have completed our review of the "Engineers Report and First Administrative Draft Environmental Impact Report/Environmental Impact Statement" for the Lower Guadalupe River Flood Protection Project. The proposed action would impact 0.07 acre of wetlands within the river channel and approximately 1 acre of wetland in a ditch adjacent to the river. Based on the relative minor size of the work proposed within Corps jurisdiction, and limited to an evaluation of impacts only within Corps jurisdictional areas, we have concluded the activity requiring Department of the Army authorization proposed in the above report does not constitute a major Federal action, and would not significantly affect the quality of the human environment (40 CFR 1502.3). Pursuant to the provisions of the National Environmental Policy (NEPA) Act of 1969, the preparation of an Environmental Impact Statement (EIS) will, therefore, not be required.

Sincerely,

Calvin C. Fong
Chief, Regulatory Branch

Copy furnished:

SCVWD, San Jose, CA (attn: Dennis Cheong)

Appendix B

Concentrations of Turbidity and Nutrients (Data)

Table B-1. U.S. Geological Survey Selected Historical Water Quality Data for the Guadalupe River for Various Water Years 1949 through 1994

	Feb 8 1946	Nov 6 1967	Mar 7 1968	Oct 29 1968	May 20 1969	Aug 1 1979	Feb 19 1980	Sep 10 1980	Mar 27 1981	Sep 1 1981	Jan 5 1982	Sep 8 1982
Streamflow (cfs)	NA	1	14	2	NA	NA	7,900	0.53	3.7	728	943	2.8
Temperature (Celsius)	NA	14	14	15	10	NA	12.5	18	15.5	19.5	11	23
pH	NA	NA	NA	NA	NA	NA	6.8	7.8	8	8	7.9	7.5
Turbidity (NTUs)	NA	NA	NA	NA	NA	NA	800	4	16	2.6	270	1.5
Dissolved Oxygen (μg/L)	NA	NA	NA	NA	NA	NA	NA	NA	84	9.8	10.5	116
Chemical Oxy. Demand (μg/L COD)	NA	NA	NA	NA	NA	NA	280	39	43	69	47	30
Hardness (μg/L $CaCO_3$)	140	NA	NA	NA	NA	NA	68	350	130	NA	113	200
Total Nitrogen (μg/L N)	NA	NA	NA	NA	NA	2.1	0.93	1.2	0.82	1.4	1.8	0.4
Total Phosphorus (μg/L P)	NA	NA	NA	NA	NA	0.07	2.8	0.22	0.21	0.24	0.25	0.09
Dissolved Arsenic (μg/L As)	NA	NA	NA	NA	NA	NA	2	4	10	2	2	2
Dissolved Cadmium (μg/L Cd)	NA	<1.4	<1.4	<1.4	<1.4	<1	0	0	1	0	1	<1
Dissolved Chromium (μg/L Cr)	NA	<1.4	<1.4	<1.4	<1.4	0	0	0	10	0	<10	<10
Dissolved Copper (μg/L Cu)	NA	<1.4	<1.4	<1.4	<1.4	2	2	2	6	2	2	5
Dissolved Lead (μg/L Pb)	NA	<1.4	<1.4	<1.4	<1.4	0	0	2	3	5	6	<1
Dissolved Manganese (μg/L Mn)	NA	171	19	15	20	30	10	0	20	0	20	20
Dissolved Mercury (μg/L Hg)	NA	NA	NA	NA	NA	0	0	0	0	0.36	<0.1	<0.1
Dissolved Nickel (μg/L Ni)	NA	234	9.7	43	37	0	0	0	0	0	<100	<100
Dissolved Selenium (μg/L Se)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Silver (μg/L Ag)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Zinc (μg/L Zn)	NA	<5.7	<5.7	<5.7	<5.7	6	190	10	20	40	10	30

Table B-1. Continued

	Jan 27 1983	Aug 30 1983	Feb 9 1985	Sep 11 1985	Jan 28 1987	Aug 11 1987	Nov 17 1987	Aug 17 1988	Jul 25 1989	Oct 25 1989	Jan 13 1990	Feb 17 1990
Streamflow (cfs)	1,540	20	116	20	36	16	47	4.3	1	29	608	210
Temperature (Celsius)	NA	NA	10	17.5	13	22	16	21	21	16	NA	10
pH	7.9	8.3	8.2	8.4	8.1	8.4	8.1	8.2	7.8	7.6	7.3	8.1
Turbidity (NTUs)	350	4.5	30	24	17	8	17	5	4.4	44	76	42
Dissolved Oxygen (μg/L)	10.6	10.6	10.8	9.4	9.2	10.4	8.6	7.9	8.6	8.1	NA	10.2
Chemical Oxy. Demand (μg/L COD)	46	24	27	10	24	<10	29	47	16	39	110	62
Hardness (μg/L $CaCO_3$)	99	350	220	340	180	340	220	350	380	110	52	120
Total Nitrogen (μg/L N)	0.8	2.9	2.1	3.2	1.7	2.3	2.8	2	1.2	1.2	2.1	2.1
Total Phosphorus (μg/L P)	0.6	0.05	0.1	0.05	0.1	0.09	0.13	0.06	0.07	0.19	0.27	0.25
Dissolved Arsenic (μg /L As)	1	1	<1	1	2	1	1	1	1	NA	NA	NA
Dissolved Cadmium (μg /L CD)	<1	<1	<1	1	<1	<1	<1	<1	<1	NA	NA	NA
Dissolved Chromium (μg /L Cr)	<10	<10	<10	NA	<1	2	2	<1	<1	NA	NA	NA
Dissolved Copper (μg /L Cu)	2	1	3	<1	2	<1	5	1	<1	NA	NA	NA
Dissolved Lead (μg /L Pb)	<1	<1	2	1	<5	<5	<5	<5	<1	NA	NA	NA
Dissolved Manganese (μg /L Mn)	10	12	8	20	10	9	13	12	16	NA	NA	NA
Dissolved Mercury (μg /L Hg)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	NA	NA
Dissolved Nickel (μg /L Ni)	<100	<100	<100	<100	<1	<1	5	3	1	NA	NA	NA
Dissolved Selenium (μg /L Se)	NA	NA	NA	NA	1	3	1	3	3	NA	NA	NA
Dissolved Silver (μg /L Ag)	NA	NA	NA	NA	<1	<1	<1	<1	<1	NA	NA	NA
Dissolved Zinc (μg/L Zn)	70	9	<3	<10	8	<3	12	10	10	NA	NA	NA

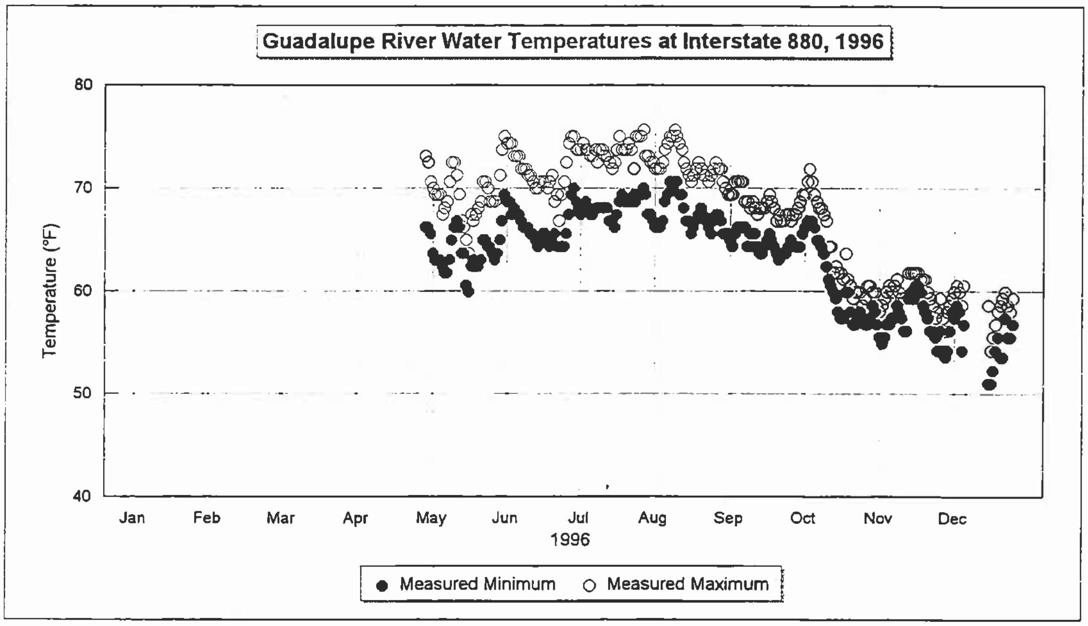
Table B-1. Continued

	Aug 27 1990	Mar 24 1991	Feb 11 1992	Dec 5 1992	Jan 5 1992	Feb 7 1993	Feb 17 1993	Mar 23 1993	Dec 14 1993	Jan 23 1994	Feb 7 1994	Mar 25 1994
Streamflow (cfs)	1.8	1,120	897	1.3	6	52	62	158	119	22	300	55
Temperature (Celsius)	20	11.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PH	7.8	8	NA	NA	NA	7.7	7.7	7.6	NA	NA	NA	NA
Turbidity (NTUs)	1.5	33	NA	260	110	90	250	80	70	27	130	100
Dissolved Oxygen (μg/L)	7.5	10.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chemical Oxy. Demand (μg/L COD)	22	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hardness (μg/L $CaCO_3$)	310	160	NA	120	110	150	130	140	98	240	120	120
Total Nitrogen (μg/L N)	5.8	1.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Phosphorus (μg/L P)	0.11	0.18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Arsenic (μg /L As)	NA	NA	2.5	4	1.7	2.2	NA	NA	NA	NA	NA	NA
Dissolved Cadmium (μg /L CD)	NA	NA	0.7	1.3	0.3	0.2	0.4	0.8	0.2	0.6	0.4	0.5
Dissolved Chromium (μg /L Cr)	NA	NA	40	56	7.3	5.5	NA	NA	NA	NA	NA	NA
Dissolved Copper (μg /L Cu)	NA	NA	33	54	18	7.9	20	24	19	15	20	26
Dissolved Lead (μg /L Pb)	NA	NA	43	63	21	13	30	34	30	19	32	31
Dissolved Manganese (μg /L Mn)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Mercury (μg /L Hg)	NA	NA	ND	0.6	ND	ND	NA	NA	NA	NA	NA	NA
Dissolved Nickel (μg /L Ni)	NA	NA	77	160	9.4	19	NA	NA	NA	NA	NA	NA
Dissolved Selenium (μg /L Se)	NA	NA	0.22	0.47	0.43	0.43	NA	NA	NA	NA	NA	NA
Dissolved Silver (μg /L Ag)	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dissolved Zinc (μg /L Zn)	NA	NA	150	210	70	45	65	120	64	62	88	98

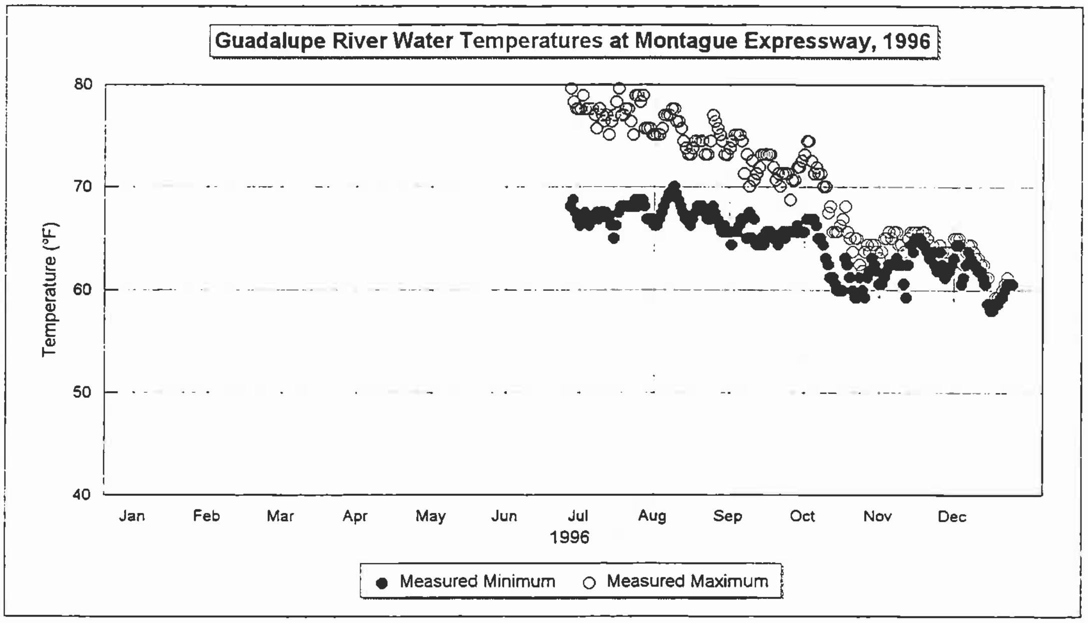
mg = micrograms per liter
NTU = Nephelometric turbidity unit
ND = Not Detectable
NA = Not Available

Source: Water Chemistry of Santa Clara Valley, California 1970, USGS Water Resources Data for California 1979 to 1983, 1985, 1987 to July 1991, and Nonpoint Source Records for Metals Concentration for Water Years 1991 to 1994.

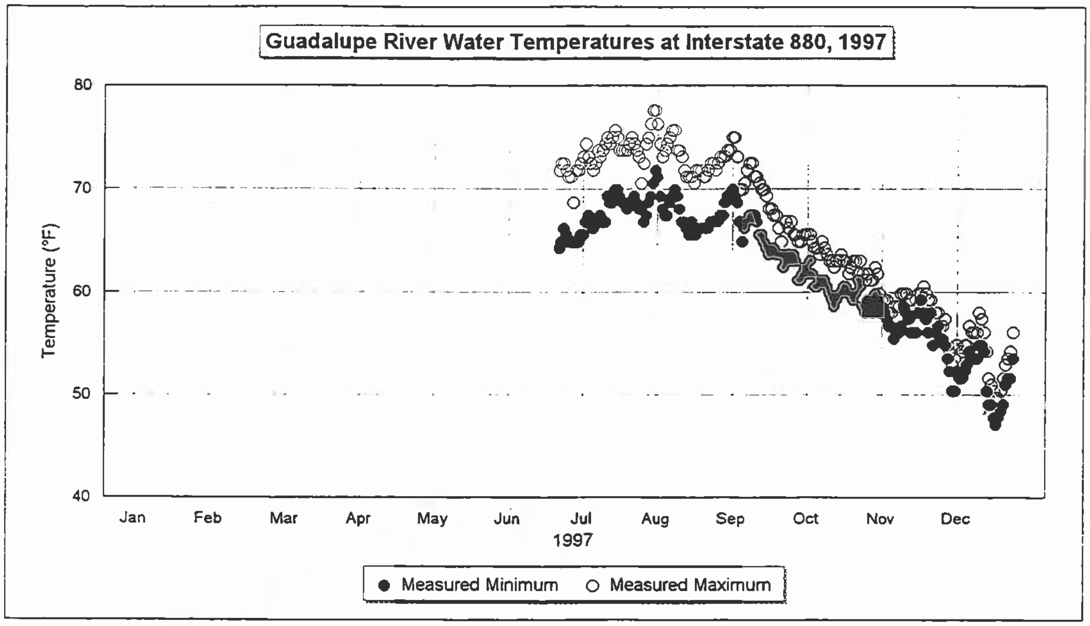
Appendix C
Temperature Data and Modeling

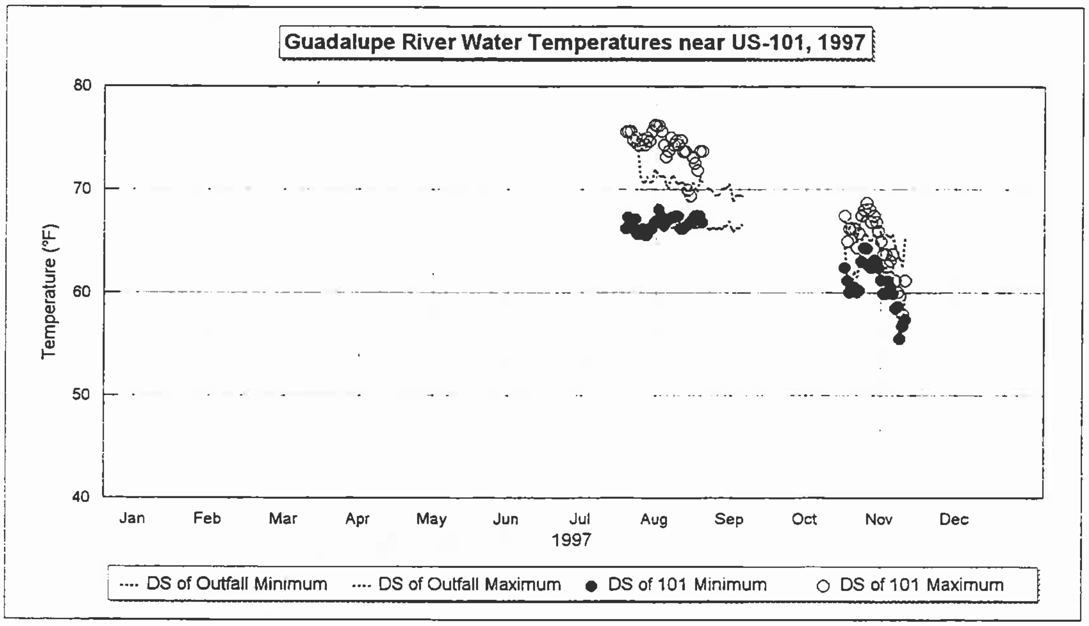


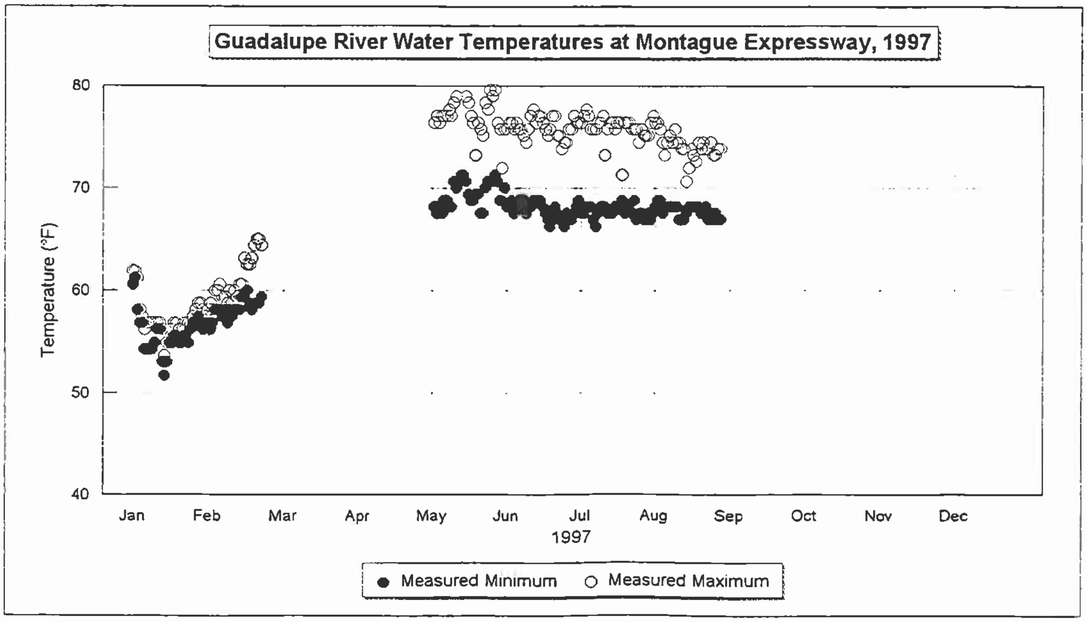
Guadalupe River Water Temperatures at Interstate 880, 1996

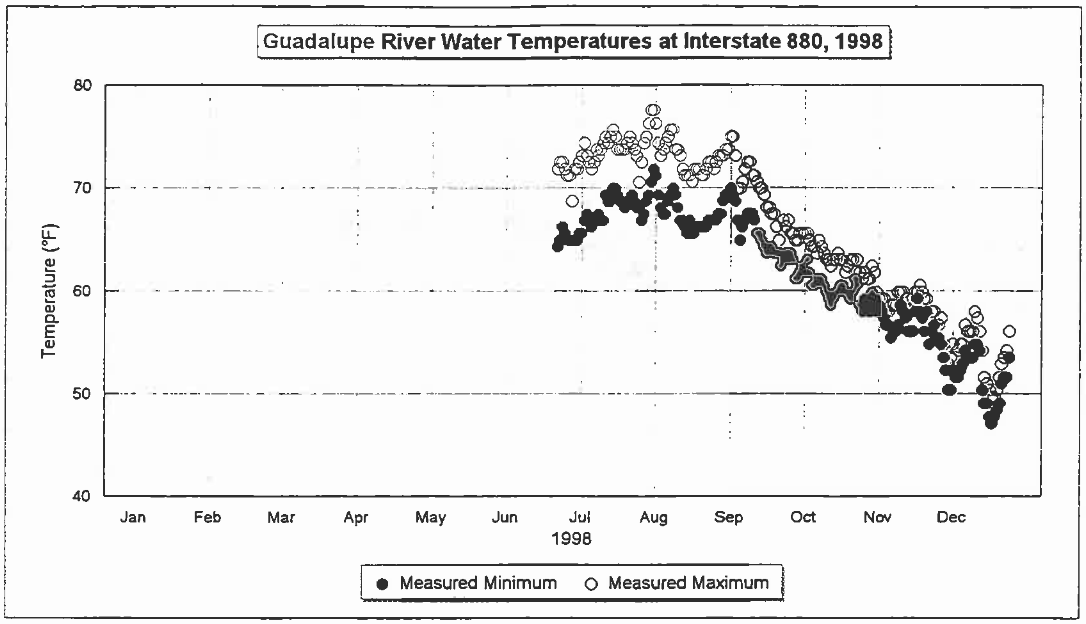


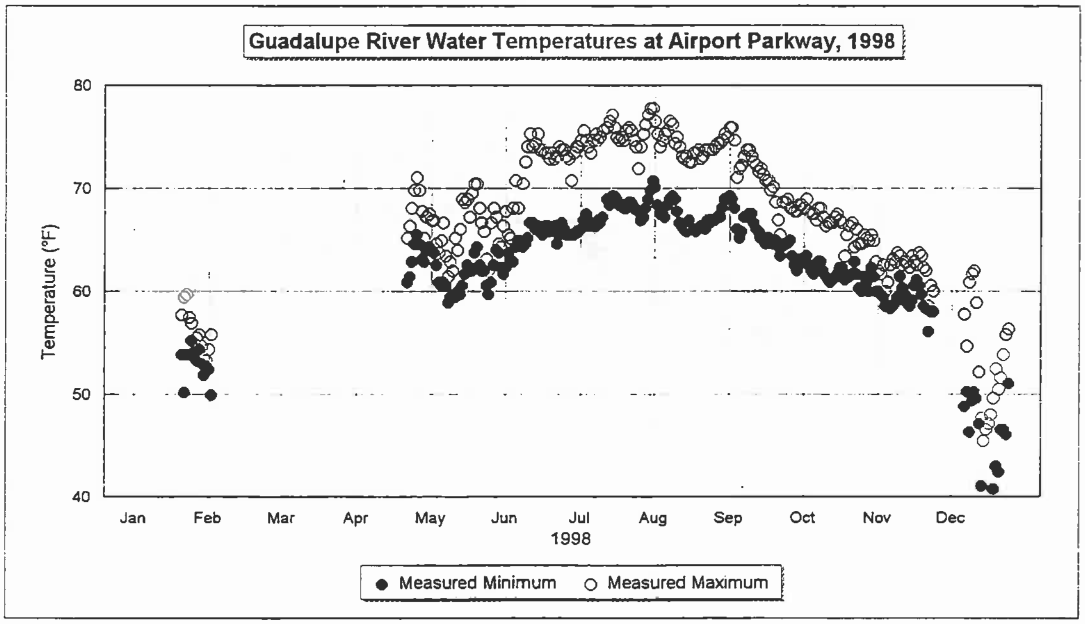
Guadalupe River Water Temperatures at Montague Expressway, 1996

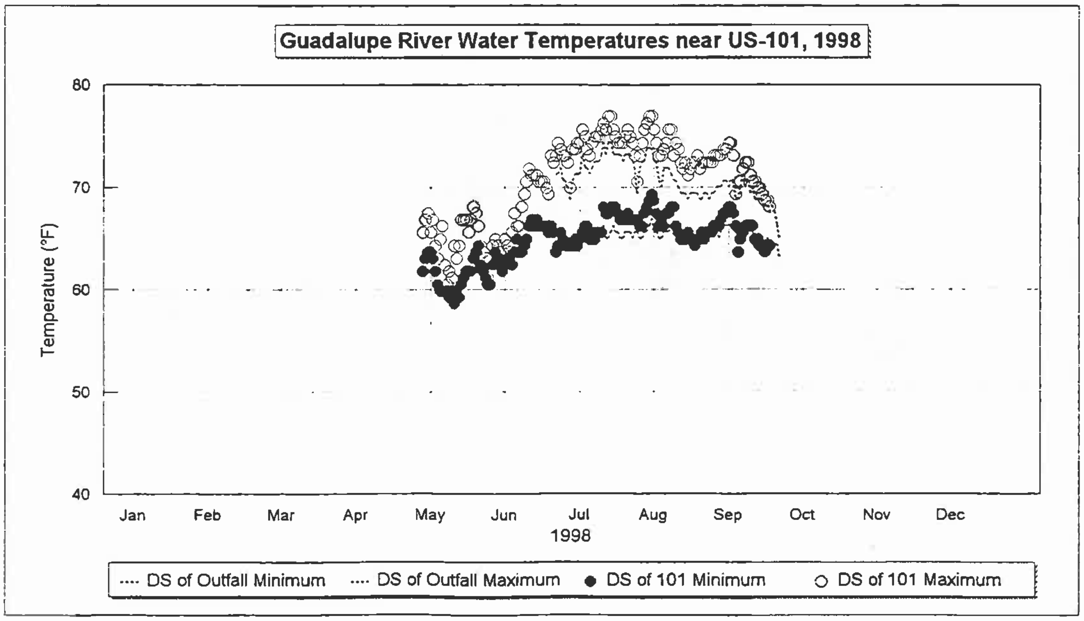

Guadalupe River Water Temperatures at Interstate 880, 1997

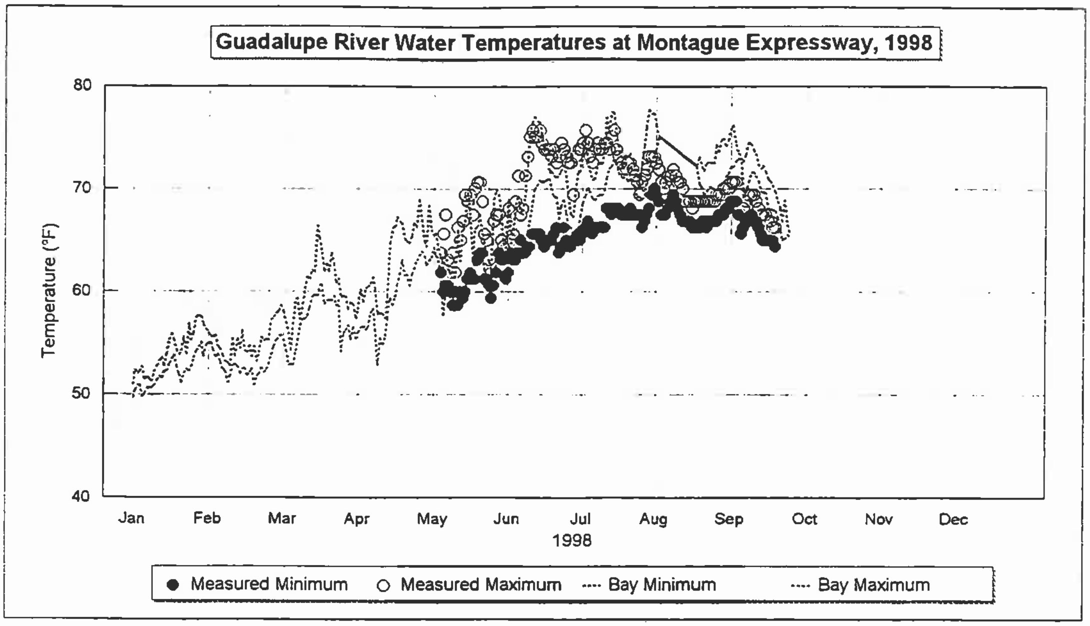

Guadalupe River Water Temperatures near US-101, 1997

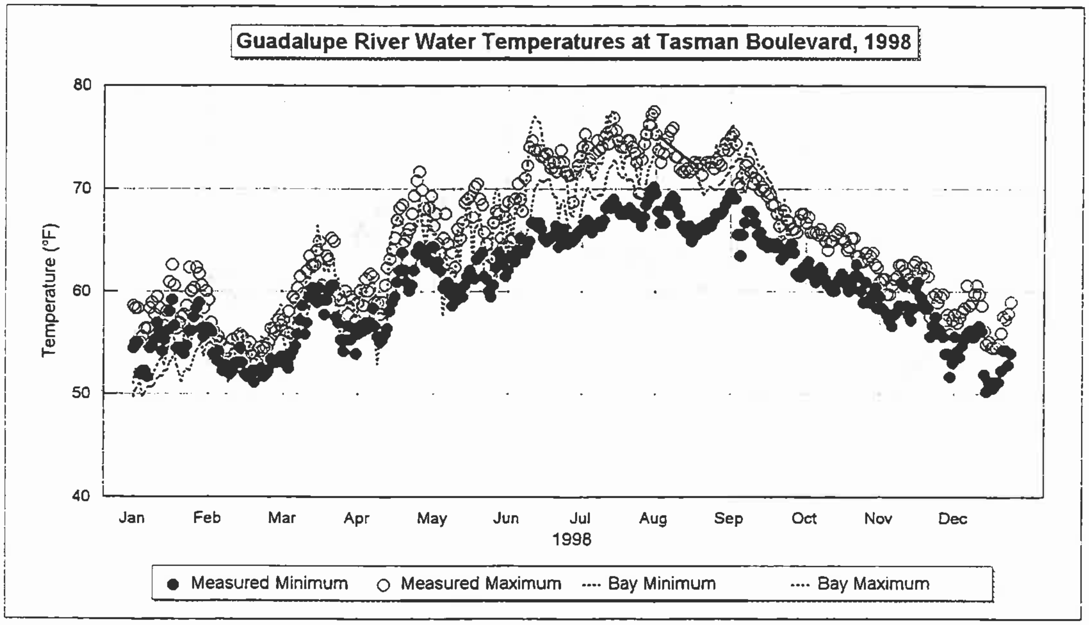

Guadalupe River Water Temperatures at Montague Expressway, 1997

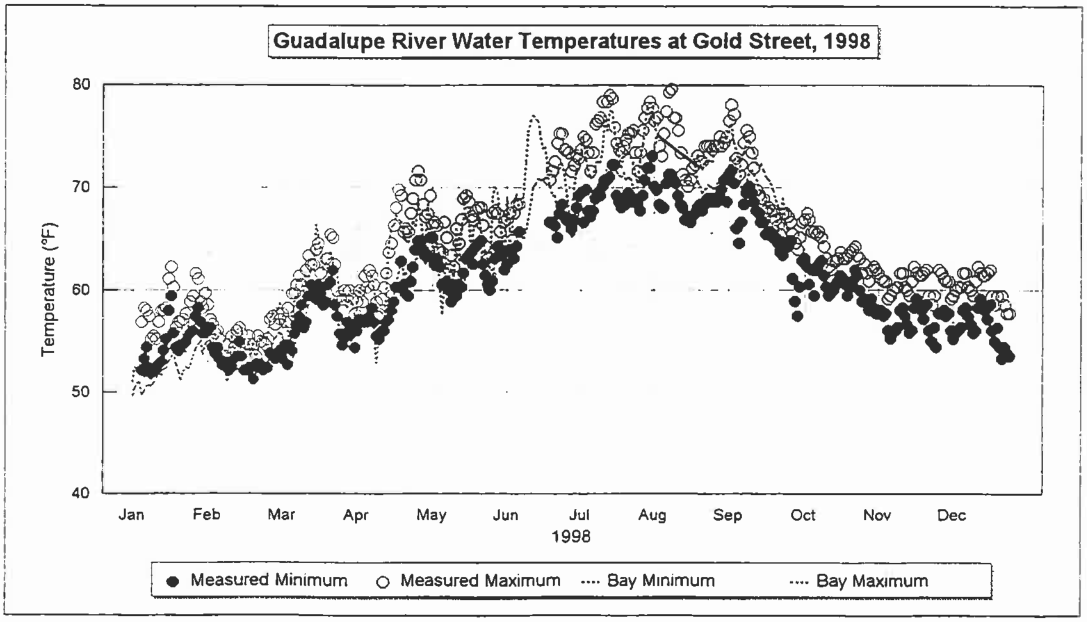

Guadalupe River Water Temperatures at Interstate 880, 1998


Guadalupe River Water Temperatures at Airport Parkway, 1998


Guadalupe River Water Temperatures near US-101, 1998


Guadalupe River Water Temperatures at Montague Expressway, 1998


Guadalupe River Water Temperatures at Tasman Boulevard, 1998


Guadalupe River Water Temperatures at Gold Street, 1998

Appendix D

Special-Status Plant and Wildlife Species with Potential to Occur in the LGRP Area

Table D-1. Special-Species Plant Species that Have Potential to Occur in the Lower Guadalupe River Project Area

Common Name/ *Scientific Name*	Source	Status Federal/ State/ CNPS[a]	Habitat	Distribution	Likelihood of Occurrence in Project Area
Robust spineflower *Chorizanthe robusta* var. *robusta*	USFWS/ CNDDB	E/–/1B	Cismontane woodlands, coastal dunes, coastal scrub	Monterey and Santa Cruz, Alameda*, San Mateo*, and Santa Clara* Counties	Highly unlikely to occur because it is thought to be extirpated from San Francisco Bay Area. Marginally-suitable habitat may be present in the downstream of the project area in upland portions of the Baylands.
Santa Clara Valley dudleya *Dudleya setchellii*	USFWS/ CNDDB	E/–/1B	Cismontane woodland, valley and foothill grassland, serpentinite, rocky	Santa Clara County	No suitable habitat in project area.
Tiburon Indian paintbrush *Castilleja affinis* ssp. *neglecta*	USFWS	E/T/1B	Southern inner north Coast Ranges, northwestern San Francisco Bay region, Marin, Napa and Santa Clara Counties	Serpentine grasslands	No suitable habitat in project area.
Contra Costa goldfields *Lasthenia conjugens/*	USFWS/ CNDDB	E/–/1B	Cismontane woodlands, alkaline playas, alkaline valley and foothill grasslands, mesic vernal pools	Alameda, Contra Costa, Monterey, Napa, and Solano, Mendocino*, Santa Barbara*, and Santa Clara* Counties	No known occurrences in the project area. Believed to be extirpated from Santa Clara County.
Coyote ceanothus *Ceanothus ferrisae/*	USFWS	E/ –/1B	Northeastern San Francisco Bay, Mount Hamilton Range, Santa Clara County	Chaparral, coastal scrub, annual grassland, on serpentine soils	No suitable habitat in project area.
Showy Indian clover *Trifolium amoenum*	USFWS	E/–/1B	Coast Range foothills, San Francisco Bay region, Mendocino County to Santa Clara County	Low elevation grasslands, including swales and disturbed areas, sometimes on serpentine soils	No suitable habitat in project area. Believed to be extirpated from Santa Clara County.

Table D-1. Continued

Common Name/ *Scientific Name*	Source	Status Federal/ State/ CNPS^a	Habitat	Distribution	Likelihood of Occurrence in Project Area
California seablite *Suaeda californica*	USFWS	E/– /1B	Coastal salt marshes	Alameda*, Santa Clara*, Morro Bay, San Luis Obispo; historically found in south San Francisco Bay	Suitable habitat present downstream of the project area in the Baylands along upper margins of salt marshes; presumed extirpated from Bay Area so highly unlikely to occur in project area.
Metcalf Canyon jewelflower *Streptanthus albidus* ssp. *albidus*	USFWS/ CNDDB	E/–/1B	Valley and foothill grassland, on serpentine	Santa Clara County	No suitable habitat in project area.
Species of Concern					
Sharsmith's harebell *Campanula sharsmithiae*	USFWS	SC/–/1B	Southern San Francisco Bay, northern inner south coast range, mount Hamilton range, Santa Clara and Stanislaus Counties	Barren, rocky serpentine areas in chaparral, 1,300-3,000'	No suitable habitat in project area.
Mt. Hamilton thistle *Cirsium fontinale* var. *campylon*	USFWS	SC/–/1B	Mt. Hamilton Range, eastern San Francisco Bay area, Alameda, Santa Clara, and Stanislaus Counties	Freshwater seeps and streams on serpentine outcrops. chaparral, cismontaine woodland, valley and foothill grassland 1000-2500'	No suitable habitat in project area.
Santa Clara red ribbons a.k.a. South Bay clarkia *Clarkia concinna* ssp. *automixa*	USFWS	SC/–/1B	Southern San Francisco Bay foothills, Alameda and Santa Clara Counties	Shaded mesic oak woodland below 5000'	No suitable habitat in project area.

Table D-1. Continued

Common Name/ *Scientific Name*	Source	Status Federal/ State/ CNPS[a]	Habitat	Distribution	Likelihood of Occurrence in Project Area
Species of Concern (Continued)					
Mt. Hamilton coreopsis *Coreopsis hamiltonii*	USFWS	SC/–/1B	Eastern San Francisco Bay, Santa Clara and Stanislaus Counties	Steep shale talus slopes of cismontane woodland	No suitable habitat in project area.
Clustered lady's-slipper *Cypripedium fasciculatum*	USFWS	SC/–/4	Northwestern California, Cascade Range, northern Sierra Nevada Mountains, southwestern San Francisco Bay area, Idaho, Oregon, Utah, Washington, Wyoming	Lower montane coniferous forest, north coast coniferous forest, usually serpentinite seeps and streambanks, 300-6,500'	No suitable habitat in project area.
Hospital Canyon larkspur *Delphinium californicum* ssp. *interius*	USFWS	SC/–/1B	Inner South Coast Ranges, eastern San Francisco Bay, Alameda, Contra Costa, Merced, San Benito, Santa Clara, San Joaquin, and San Luis Obispo Counties	Openings in chaparral, mesic cismontane woodland, on moist slopes and ravines, 750-3,600'	No suitable habitat in project area.
Brandegee's eriastrum *Eriastrum brandegeae*	USFWS	SC/–/1B	Inner North Coast Ranges to East San Francisco Bay area: Colusa, Glenn, Lake, Santa Clara, Tehama, and Trinity Counties	Chaparral, oak woodland on volcanic substrate	No suitable habitat in project area.
Hoover's button-celery *Eryngium aristulatum* var. *hooveri*	USFWS	SC/–/4	San Benito, Santa Clara, and San Luis Obispo Counties	Vernal pools	No suitable habitat in project area.

Table D-1. Continued

Common Name/ *Scientific Name*	Source	Status Federal/ State/ CNPS[a]	Habitat	Distribution	Likelihood of Occurrence in Project Area
Species of Concern (Continued)					
San Francisco wallflower *Erysimum franciscanum*	USFWS	SC/–/4	Marin, Santa Clara, Santa Cruz, San Francisco, San Mateo, and Sonoma Counties	Coastal dunes, coastal scrub, valley and foothill grassland, often serpentinite or granitic substrates	No suitable habitat in project area.
Talus fritillary *Fritillaria falcata*	USFWS	SC/–/1B	South inner coast ranges. Alameda, Monterey, San Benito, Santa Clara, and Stanislaus Counties	Chaparral, oak woodland, coniferous forest on serpentinite talus	No suitable habitat in project area.
Fragrant fritillary *Fritillaria liliacea*	USFWS	SC/–/1B	Coast Ranges from Marin County to San Benito County	Adobe soils of interior foothills, coastal prairie, coastal scrub, annual grassland, often on serpentinite, below 1,350'	No suitable habitat in project area.
Delta tule pea *Lathyrus jepsonii* var. *jepsonii*	USFWS	SC/–/1B	Central valley, especially the San Francisco Bay region, Alameda, Contra Costa, Fresno, Marin, Napa, Sacramento, San Benito, Santa Clara, San Joaquin, and Solano Counties	Coastal and estuarine marshes, below 1000'	No suitable habitat in project area.
Smooth lessingia *Lessingia micradenia* var. *glabrata*	USFWS	SC/–/1B	Santa Clara County	Chaparral on serpentinite, often on roadsides, 400-1,380'	No suitable habitat in project area.
Hall's bush mallow *Malacothamnus hallii*	CNDDB	–/–/1B	Alameda, Contra Costa, Merced, and Santa Clara Counties	Chaparral between 30-2,500'	No suitable habitat in project area.

Table D-1. Continued

Common Name/ *Scientific Name*	Source	Status Federal/ State/ CNPS[a]	Habitat	Distribution	Likelihood of Occurrence in Project Area
Species of Concern (Continued)					
Gairdner's yampah *Perideridia gairdneri* ssp. *gairdneri*	USFWS	SC/–/4	Kern, Los Angeles*, Mendocino, Monterey, Marin, Napa, Orange*, San Benito, Santa Clara, Santa Cruz, San Diego*, San Luis Obispo, San Mateo*, Solano, and Sonoma Counties	Broad-leaved upland forest, chaparral, coastal prairie, valley and foothill grassland, vernal pools, in mesic areas	No suitable habitat in project area.
Mount Diablo phacelia *Phacelia phacelioides*	USFWS	SC/–/1B	South Coast Ranges from Contra Costa County to San Benito County	Chaparral, oak woodland, adjacent to trails, on rock outcrops and talus slopes, 2,000-3,000'	No suitable habitat in project area.
Hairless popcorn-flower *Plagiobothrys glaber*	CNDDB	–/–/1A	Coastal valleys from Marin County to San Benito Counties	Alkaline meadows, coastal salt marsh	No suitable habitat in project area.
Hooked popcorn-flower *Plagiobothrys uncinatus*	USFWS	SC/–/1B	Monterey, San Benito, Santa Clara, and San Luis Obispo Counties	Chaparral, cismontane woodland, valley and foothill grassland, in sandy areas	No suitable habitat in project area.
Rock sanicle *Sanicula saxatilis*	USFWS	SC/R/1B	Contra Costa and Santa Clara Counties	Bedrock outcrops and talus slopes in chaparral or oak woodland, 2,000-4,100'	No suitable habitat in project area.
Most beautiful jewel-flower *Streptanthus albidus* ssp. *peramoenus*	USFWS	SC/–/1B	Eastern San Francisco Bay area, Central south coastal outer ranges. Alameda, Contra Costa, and Santa Clara Counties	Chaparral, annual grassland, on ridges and slopes on serpentinite outcrops, 450-3,200'	No suitable habitat in project area.

Table D-1. Continued

Common Name/ *Scientific Name*	Source	Status Federal/ State/ CNPS[a]	Habitat	Distribution	Likelihood of Occurrence in Project Area
Species of Concern (Continued)					
Mt. Hamilton jewel-flower *Streptanthus callistus*	USFWS	SC/–/1B	Santa Clara County	Chaparral, cismontane woodland	No suitable habitat in project area.
Alkali milk-vetch *Astragalus tener* var. *tener*	USFWS/ CNDDB	–/–/1B	Merced, Solano, and Yolo Counties; historically more widespread	Grassy flats and vernal pool margins, on alkali soils, below 200'	No suitable habitat in project area. Possibly extirpated from the area.
San Joaquin spearscale *Atriplex joaquiniana*	USFWS	SC/–/1B	West edge of Central Valley from Glenn County to Tulare County	Alkali grassland, alkali scrub, alkali meadows, saltbush scrub, below 1,000'	No suitable habitat in project area. Possibly extirpated from the area.
Point Reyes bird's-beak *Cordylanthus maritimus* ssp. *palustris*	USFWS/ CNDDB	SC/–/1B	Coastal Northern California, Humboldt County to Santa Clara County	Coastal salt marsh	No suitable habitat in project area. Possibly extirpated from the area.
Caper-fruited tropidocarpum *Tropidocarpum capparideum*	USFWS/ CNDDB	SC/–/1A	Historically known from the norhtwest San Joaquin Balley and adjacent Coast Range foothills	Grasslands in alkaline hills below 1,500'	No suitable habitat in project area. Possibly extinct.
Congdon's tarplant *Hemizonia parryi* ssp. *congdonii*	USFWS/ CNDDB	SC/–/1B	East San Francisco Bay Area, Salinas Valley, Los Osos Valley	Annual grassland, on lower slopes, flats, and swales, sometimes on alkaline or saline soils, below 700'	No suitable habitat in project area. Possibly extirpated from the area.
San Francisco Bay spineflower *Chorizanthe cuspidata* var. *cuspidata*	USFWS	SC/–/1B	Central coast, San Francisco bay area. Alameda*, Marin, San Francisco, San Mateo, Sonoma and possibly Santa Clara Counties	Coastal bluff scrub, coastal dunes, coastal prairie, coastal scrub on sandy soils	No suitable habitat in project area. Possibly extirpated from the area.

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[a] Status definitions:

* Believed to be extirpated.

Federal

E = listed as endangered under the federal Endangered Species Act.
SC = Species of concern; species for which existing information indicates it may warrant listing but for which substantial biological information to support a proposed rule is lacking.
– = no listing.

State

– = no listing.

California Native Plant Society

1A = List 1A species; presumed extinct in California.
1B = List 1B species; rare, threatened, or endangered in California and elsewhere.
– = no listing.

Table D-2. Special-Status Wildlife Species that Have Potential to Occur in the Lower Guadalupe River Project Area

Common Name/ *Scientific Name*	Source	Status Federal/State	Habitat	Distribution	Reason for Decline	Likelihood of Occurrence in Project Area	Species to be Addressed in More Detail (Y/N)
Listed Species							
Marbled murrelet/ *Brachyramphus marmoratus*	USFWS	T/E	Nesting sites from the Oregon border to Eureka and between Santa Cruz and Half Moon Bay; winters in nearshore and offshore waters along the entire California coastline	Mature, coastal coniferous forests for nesting; nearby coastal water for foraging; nests in conifer stands greater than 150 years old and may be found up to 35 miles inland; winters on subtidal and pelagic waters often well offshore	Loss of old-growth nesting habitat, drowning from entanglement in gill nets, oil-spill threats, potential increase in egg and nestling mortality from habitat fragmentation along the entire coastline	Outside of the species known range. No suitable habitat in the project area.	N
Western snowy plover/ *Charadrius alexandrinus nivosus*	CNDDB	T/SSC (Coastal)	Winters along the coast from Del Norte County to San Diego County: breeding sites within this range are very limited	Coastal beaches above the normal high tide limit with wood or other debris for cover	Human disturbance on nesting beaches, feral animal and non-native predator disturbance, loss of habitat	No suitable habitat in the project area. Suitable habitat is present downstream of the project site.	Y
		–/SSC (Inland)	Nests at inland lakes throughout northeastern, central, and southern California	Inland shores of salt ponds and alkali or brackish inland lakes			

Table D-2. Continued

Common Name/ *Scientific Name*	Source	Status Federal/State	Habitat	Distribution	Reason for Decline	Likelihood of Occurrence in Project Area	Species to be Addressed in More Detail (Y/N)
Listed Species (continued)							
Willow flycatcher/ *Empidonax traillii*	USFWS	SC/E	Summer range includes a narrow strip along the eastern Sierra Nevada from Shasta County to Kern County, another strip along the western Sierra Nevada from El Dorado County to Madera County; widespread in migration	Riparian areas and large, wet meadows with abundant willows for breeding; usually found in riparian habitats during migration	Loss of riparian breeding habitat, nest parasitism by brown-headed cowbirds	Outside of the species known nesting range. May occur in the project area during migration.	N
Bald eagle/ *Haliaeetus leucocephalus*	USFWS	T/E	Nests in Siskiyou, Modoc, Trinity, Shasta, Lassen, Plumas, Butte, Tehama, Lake, and Mendocino Counties and in the Lake Tahoe Basin; reintroduced into central coast; winter range includes the rest of California, except the southeastern deserts, very high altitudes in the Sierras, and east of the Sierra Nevada	In western North America, nests and roosts in coniferous forests within 1 mile of a lake, a reservoir, a stream, or the ocean	Nest sites vulnerable to human disturbance, pesticide contamination south of Mono County; range expanding	No suitable habitat in the project area due to high disturbance factors in surrounding areas.	N

Table D-2. Continued

Common Name/ *Scientific Name*	Source	Status Federal/State	Habitat	Distribution	Reason for Decline	Likelihood of Occurrence in Project Area	Species to be Addressed in More Detail (Y/N)
Listed Species (continued)							
Black rail/ *Laterallus jamaicensis*	USFWS	SC/T	Permanent resident in the San Francisco Bay and eastward through the Delta into Sacramento and San Joaquin Counties; small populations in Marin, Santa Cruz, San Luis Obispo, Orange, Riverside, and Imperial Counties	Tidal salt marshes associated with heavy growth of pickleweed; also occurs in brackish marshes or freshwater marshes at low elevations	Loss of wetland habitat	Suitable habitat present in the lower reaches of the project area. No known occurrences in the project area.	Y/N
Brown pelican/ *Pelecanus occidentalis*	USFWS	E/E	Present along the entire coastline, but does not breed north of Monterey County; extremely rare inland	Typically in littoral ocean zones, just outside the surf line; nests on offshore islands	Human disturbance at breeding colonies, natural fluctuations in prey base populations during breeding season, pesticide contamination	Outside of the species known range. No suitable habitat in the project area.	N
California clapper rail/ *Rallus longirostris obsoletus*	CNDDB	E/E	Marshes around the San Francisco Bay and east to Suisun Marsh	Restricted to salt marshes and tidal sloughs; usually associated with heavy growth of pickleweed; feeds on mollusks removed from the mud in sloughs	Loss of wetland habitat and predation by non-native predators, shooting	Marginal habitat is present in the downstream portions of the project area. More suitable habitat is present downstream of the project site.	Y

Table D-2. Continued

Common Name/ *Scientific Name*	Source	Status Federal/State	Habitat	Distribution	Reason for Decline	Likelihood of Occurrence in Project Area	Species to be Addressed in More Detail (Y/N)
Listed Species (continued)							
California least tern/ *Sterna antillarum (=albifrons) browni*	USFWS	E/E	Nests on beaches along the San Francisco Bay and along the southern California coast from southern San Luis Obispo County south to San Diego County	Nests on sandy, upper ocean beaches, and occasionally uses mudflats; forages on adjacent surf line, estuaries, or the open ocean	Disturbance or elimination of shoreline nesting habitat, predation by feral cats	The project area may provide suitable foraging habitat. More suitable habitat is present downstream of the project site.	Y
Vernal pool tadpole shrimp/ *Lepidurus packardi*	CNDDB	E/–	Shasta County south to Merced County	Vernal pools and ephemeral stock ponds	Habitat loss to agricultural and urban development	No suitable habitat in the project area.	N
Vernal pool fairy shrimp/ *Branchinecta lynchi*	USFWS	T/–	Central Valley, central and south Coast Ranges from Tehama County to Santa Barbara County; isolated populations also in Riverside County	Common in vernal pools; also found in sandstone rock outcrop pools	Habitat loss to agricultural and urban development	No suitable habitat in the project area.	N
Bay checkerspot butterfly/ *Euphydryas editha bayensis*	USFWS	T/–	Vicinity of San Francisco Bay	Native grasslands on outcrops of serpentine soil; California plantain and owl's clover are host plants	Loss of habitat to development	No suitable habitat in the project area.	N

Table D-2. Continued

Common Name/ *Scientific Name*	Source	Status Federal/State	Habitat	Distribution	Reason for Decline	Likelihood of Occurrence in Project Area	Species to be Addressed in More Detail (Y/N)
Listed Species (continued)							
California red-legged frog/ *Rana aurora draytonii*	CNDDB	T/SSC, P	Found along the coast and coastal mountain ranges of California from Humboldt County to San Diego County; Sierra Nevada (midelevations [above 1,000 feet] from Butte County to Fresno County)	Permanent and semipermanent aquatic habitats, such as creeks and coldwater ponds, with emergent and submergent vegetation and riparian species along the edges; may estivate in rodent burrows or cracks during dry periods	Alteration of stream and wetland habitats, overharvesting (historically), habitat destruction, competition and predation by fish and bullfrogs	No suitable habitat in the project area.	Y
Salt-marsh harvest mouse/ *Reithrodontomys raviventris*	CNDDB	E/E	San Francisco, San Pablo, and Suisun Bays	Salt marshes with a dense plant cover of pickle-weed and fat hen; adjacent to an upland site	Habitat loss to urban development and salt production	No suitable habitat is present in the project area. Suitable habitat is present downstream of the project site.	Y

Table D-2. Continued

Common Name/ *Scientific Name*	Source	Status Federal/State	Habitat	Distribution	Reason for Decline	Likelihood of Occurrence in Project Area	Species to be Addressed in More Detail (Y/N)
Listed Species (continued)							
San Joaquin kit fox/ *Vulpes macrotis mutica*	USFWS	E/T	Principally occurs in the San Joaquin Valley and adjacent open foothills to the west; recent records from 17 counties extending from Kern County north to Contra Costa County	Saltbush scrub, grassland, oak, savanna, and freshwater scrub	Habitat loss to agricultural development; altered habitat from grazing, mining, and industrial development; predation by dogs and non-native red foxes	Outside of the species known range. No suitable habitat in the project area.	N
Riparian brush rabbit/ *Sylvilagus bachmani riparius*	USFWS	E/SSC	Limited to San Joaquin County at Caswell State Park near the confluence of the Stanislaus and San Joaquin Rivers	Dense thickets of brush associated with riparian or chaparral habitats	Clearing and burning of brush, degradation of habitat from grazing and recreational vehicles	Outside of the species known range. No suitable habitat in the project area.	N
Alameda whipsnake/ *Masticophis lateralis euryxanthus*	USFWS	T/T	Restricted to Alameda and Contra Costa Counties	Valleys, foothills, and low mountains associated with northern coastal scrub or chaparral habitat; requires rock outcrops for cover and foraging	Limited range and restricted habitat, loss of habitat from urban development, predation by domestic cats	Outside of the species known range. No suitable habitat in the project area.	N

Table D-2. Continued

Common Name/ *Scientific Name*	Source	Status Federal/State	Habitat	Distribution	Reason for Decline	Likelihood of Occurrence in Project Area	Species to be Addressed in More Detail (Y/N)
Listed Species (continued)							
San Francisco garter snake/ *Thamnophis sirtalis tetrataenia*	USFWS	E/E	Northern San Mateo County southward along the coast and the eastern slope of the Santa Cruz Mountains to the Santa Clara County line	Favors ponds, lakes, and marshy areas containing abundant vegetation, which it uses for cover	Loss of habitat from urban and agricultural development, altered habitat from channelization of streams	Outside of the species known range. No suitable habitat in the project area.	N
Giant garter snake/ *Thamnophis gigas*	USFWS	T/T	Central Valley from Fresno north to the Gridley/Sutter Buttes area; has been extirpated from areas south of Fresno	Sloughs, canals, and other small waterways where there is a prey base of small fish and amphibians; requires grassy banks and emergent vegetation for basking and areas of high ground protected from flooding during winter	Loss of habitat from agriculture and urban development, habitat fragmentation	Outside of the species known range. No suitable habitat in the project area.	N

Table D-2. Continued

Common Name/ *Scientific Name*	Source	Status Federal/State	Habitat	Distribution	Reason for Decline	Likelihood of Occurrence in Project Area	Species to be Addressed in More Detail (Y/N)
Proposed Species							
Mountain plover/ *Charadrius montanus*	USFWS	PT/SSC	Does not breed in California; in winter, found in the Central Valley south of Yuba County, along the coast in parts of San Luis Obispo, Santa Barbara, Ventura, and San Diego Counties; parts of Imperial, Riverside, Kern, and Los Angeles Counties	Occupies open plains or rolling hills with short grasses or very sparse vegetation; nearby bodies of water are not needed; may use newly plowed or sprouting grainfields	Loss of habitat to agriculture and urban development; decline of California's wintering population may be attributable to disturbance of breeding population	Outside of the species known range. No suitable habitat in the project area.	N
Candidate Species							
California tiger salamander/ *Ambystoma californiense (=A. tigrinum c.)*	CNDDB	C/SSC	Central Valley, including Sierra Nevada foothills, up to approximately 1,000 feet, and coastal region from Butte County south to Santa Barbara County	Small ponds, lakes, or vernal pools in grasslands and oak woodlands for larvae; rodent burrows, rock crevices, or fallen logs for cover for adults and for summer dormancy	Loss of grasslands, vernal pools, and other wetlands to agricultural development and urbanization	No suitable habitat in the project area.	Y

Table D-2. Continued

Common Name/ *Scientific Name*	Source	Status Federal/State	Habitat	Distribution	Reason for Decline	Likelihood of Occurrence in Project Area	Species to be Addressed in More Detail (Y/N)
Species of Concern							
Western burrowing owl/ *Athene cunicularia hypugea*	USFWS	SC/SSC	Lowlands throughout California, including the Central Valley, northeastern plateau, southeastern deserts, and coastal areas; rare along south coast	Rodent burrows in sparse grassland, desert, and agricultural habitats	Loss of habitat, human disturbance at nesting burrows		Y
Saltmarsh common yellowthroat/ *Geothlypis trichas sinuosa*	USFWS	SC/SSC	Found only in the San Francisco Bay Area in Marin, Napa, Sonoma, Solano, San Francisco, San Mateo, Santa Clara, and Alameda Counties	Freshwater marshes in summer and salt or brackish marshes in fall and winter; requires tall grasses, tules, and willow thickets for nesting and cover	Loss of marsh breeding habitat	Suitable habitat is present in the downstream portions of the project area. Additional suitable habitat is present downstream of the project site.	Y
Alameda (South Bay) song sparrow/ *Melospiza melodia pusillula*	USFWS	SC/SSC	Found only in marshes along the southern portion of the San Francisco Bay	Brackish marshes associated with pickleweed; may nest in tall vegetation or among the pickleweed	Loss of tidal marshes	No suitable habitat is present in the project area. Suitable habitat is present downstream of the project site.	Y

Table D-2. Continued

Common Name/ *Scientific Name*	Source	Status Federal/State	Habitat	Distribution	Reason for Decline	Likelihood of Occurrence in Project Area	Species to be Addressed in More Detail (Y/N)
Species of Concern (continued)							
Southwestern pond turtle/ *Clemmys marmorata pallida*	USFWS	SC/SSC, P	Occurs along the central coast of California east to the Sierra Nevada and along the southern California coast inland to the Mojave and Sonora Deserts; range overlaps with that of the northwestern pond turtle throughout the Delta and in the Central Valley from Sacramento County to Tulare County	Woodlands, grasslands, and open forests; aquatic habitats, such as ponds, marshes, or streams, with rocky or muddy bottoms and vegetation for cover and food	Loss and alteration of aquatic and wetland habitats, habitat fragmentation	Marginal habitat is present in portions of the project area.	Y

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[a] Status definitions:

* Believed to be extirpated.

Federal

E = listed as endangered under the federal Endangered Species Act.
T = listed as threatened under the federal Endangered Species Act.
C = considered a candidate for listing under the federal Endangered Species Act.
SC = Species of concern; species for which existing information indicates it may warrant listing but for which substantial biological information to support a proposed rule is lacking.
– = no listing.

State

– = no listing.

MARCH 3, 1849

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825-1846

IN REPLY REFER TO:
1-1-01-SP-887

January 29, 2001

Mr. Harry Oakes
Habitat Restoration Specialist
Jones and Stokes
2600 V Street
Sacramento, California 95818

Subject: Species List for Project located along the Guadalupe River between Interstate 880 and the City of Alviso, Santa Clara County, California

Dear Mr. Oakes:

We are sending the enclosed list in response to your January 24, 2001, request for information about endangered and threatened species (Enclosure A). The list covers the following U.S. Geological Survey 7½ minute quad or quads: Milpitas and San Jose West Quads.

Please read *Important Information About Your Species List* (enclosed). It explains how we made the list and describes your responsibilities under the Endangered Species Act. Please contact Harry Mossman, Biological Technician, at (916) 414-6674, if you have any questions about the attached list or your responsibilities under the Endangered Species Act. For the fastest response to species list requests, address them to the attention of Mr. Mossman at this address. You may fax requests to him at 414-6712 or 6713.

Sincerely,

for Jan C. Knight
Chief, Endangered Species Division

Enclosures

Important Information
About Your Species List

How We Make Species Lists

We store information about endangered and threatened species lists by U.S. Geological Survey 7½ minute *quads*. The United States is divided into these quads, which are about the size of San Francisco. If you requested your list by quad name or number, that is what we used. Otherwise, we used the information you sent us to determine which quad or quads to use.

Animals

The animals on your species list are ones that occur within, *or may be affected by projects within*, the quads covered by the list. Fish and other aquatic species appear on your list if they are in the same watershed as your quad or if water use in your quad might affect them.

Plants

Any plants on your list are ones *that have actually been observed* in the quad or quads covered by the list. We have also included either a county species list or a list of species in nearby quads. We recommend that you check your project area for these plants. Plants may exist in an area without ever having been detected there.

Surveying

Some of the species on your list may not be affected by your project. A trained biologist or botanist, familiar with the habitat requirements of the species on your list, should determine whether they or habitats suitable for them may be affected by your project. We recommend that your surveys include any proposed and candidate species on your list. For plant surveys, we recommend using the enclosed *Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Species*. The results of your surveys should be published in any environmental documents prepared for your project.

State-Listed Species

If a species has been listed as threatened or endangered by the State of California, but not by us nor by the National Marine Fisheries Service, it will appear on your list as a Species of Concern. *However you should contact the California Department of Fish and Game for official information about these species.* Call (916) 322-2493 or write Marketing Manager, California Department of Fish and Game, Natural Diversity Data Base, 1416 Ninth Street, Sacramento, California 95814.

Your Responsibilities Under the Endangered Species Act

All plants and animals identified as *listed* on Enclosure A are fully protected under the Endangered Species Act of 1973, as amended. Section 9 of the Act and its implementing regulations prohibit the *take* of a federally listed wildlife species. Take is defined by the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any such animal. Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR §17.3).

Take incidental to an otherwise lawful activity may be authorized by one of two procedures:

> If a Federal agency is involved with the permitting, funding, or carrying out of a project that may result in take, then that agency must engage in a *formal consultation* with the Service. Such consultation would result in a *biological opinion* addressing the anticipated effect of the project on listed and proposed species. The opinion may authorize a limited level of incidental take.
>
> If no Federal agency is involved with the project, and federally listed species may be taken as part of the project, then you, the applicant, should apply for an *incidental take permit*. The Service may issue such a permit if you submit a satisfactory conservation plan for the species that would be affected by your project. Should your survey determine that federally listed or proposed species occur in the area and are likely to be affected by the project, we recommend that you work with this office and the California Department of Fish and Game to develop a plan that mitigates for the project's direct and indirect impacts to listed species and compensates for project-related loss of habitat. You should include the mitigation plan in any environmental documents you file.

Critical Habitat

When a species is listed as endangered or threatened, areas of habitat considered essential to its conservation may be designated as *critical habitat*. These areas may require special management considerations or protection. They provide needed space for growth and normal behavior; food, water, air, light, other nutritional or physiological requirements; cover or shelter; and sites for breeding, reproduction, rearing of offspring, germination or seed dispersal.

Although critical habitat may be designated on private or State lands, activities on these lands are not restricted unless there is Federal involvement in the activities or direct harm to listed wildlife.

If any species has proposed or designated critical habitat within a quad, there will be a separate line for this on the species list. Maps and boundary descriptions of the critical habitat may be found in the *Federal Register*. The information is also reprinted in the *Code of Federal Regulations* (50 **CFR** 17.95).

Candidate Species

We recommend that you address impacts to *candidate* species. We put plants and animals on our candidate list when we have enough scientific information to eventually propose them for listing as threatened or endangered. By considering these species early in your planning process you may be able to avoid the problems that could develop if one of these candidates was listed before the end of your project.

Your list may contain a section called *Species of Concern*. This term includes former *category 2 candidate species* and other plants and animals of concern to the Service and other Federal, State and private conservation agencies and organizations. Some of these species may become candidate species in the future.

Wetlands

If your project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act, you will need to obtain a permit from the U.S. Army Corps of Engineers. Impacts to wetland habitats require site specific mitigation and monitoring. For questions regarding wetlands, please contact Mark Littlefield of this office at (916) 414-6580.

Updates

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed, candidate and special concern species in your planning, this should not be a problem. We also continually strive to make our information as accurate as possible. Sometimes we learn that a particular species has a different range than we thought. This should not be a problem if you consider the species on the county or surrounding-quad lists that we have enclosed. If you have a long-term project or if your project is delayed, please feel free to contact us about getting a current list. You can also find out the current status of a species by going to the Service's Internet page: *www.fws.gov*

GUIDELINES FOR CONDUCTING AND REPORTING BOTANICAL INVENTORIES FOR FEDERALLY LISTED, PROPOSED AND CANDIDATE PLANTS

(September 23, 1996)

These guidelines describe protocols for conducting botanical inventories for federally listed, proposed and candidate plants, and describe minimum standards for reporting results. The Service will use, in part, the information outlined below in determining whether the project under consideration may affect any listed, proposed or candidate plants, and in determining the direct, indirect, and cumulative effects.

Field inventories should be conducted in a manner that will locate listed, proposed, or candidate species (target species) that may be present. The entire project area requires a botanical inventory, except developed agricultural lands. The field investigator(s) should:

1. Conduct inventories at the appropriate times of year when target species are present and identifiable. Inventories will include all potential habitats. Multiple site visits during a field season may be necessary to make observations during the appropriate phenological stage of all target species.

2. If available, use a regional or local reference population to obtain a visual image of the target species and associated habitat(s). If access to reference populations is not available, investigators should study specimens from local herbaria.

3. List every species observed and compile a comprehensive list of vascular plants for the entire project site. Vascular plants need to be identified to a taxonomic level which allows rarity to be determined.

4. Report results of botanical field inventories that include:

    a. a description of the biological setting, including plant community, topography, soils, potential habitat of target species, and an evaluation of environmental conditions, such as timing or quantity of rainfall, which may influence the performance and expression of target species.

    b. a map of project location showing scale, orientation, project boundaries, parcel size, and map quadrangle name.

    c. survey dates and survey methodology(ies).

    d. if a reference population is available, provide a written narrative describing the target species reference population(s) used, and date(s) when observations were made.

    e. a comprehensive list of all vascular plants occurring on the project site for each habitat type.

    f. current and historic land uses of the habitat(s) and degree of site alteration.

g. presence of target species off-site on adjacent parcels, if known.

h. an assessment of the biological significance or ecological quality of the project site in a local and regional context.

5. If target species is(are) found, report results that additionally include:

   a. a map showing federally listed, proposed and candidate species distribution as they relate to the proposed project.

   b. if target species is (are) associated with wetlands, a description of the direction and integrity of flow of surface hydrology. If target species is (are) affected by adjacent off-site hydrological influences, describe these factors.

   c. the target species phenology and microhabitat, an estimate of the number of individuals of each target species per unit area; identify areas of high, medium and low density of target species over the project site, and provide acres of occupied habitat of target species. Investigators could provide color slides, photos or color copies of photos of target species or representative habitats to support information or descriptions contained in reports.

   d. the degree of impact(s), if any, of the proposed project as it relates to the potential unoccupied habitat of target habitat.

6. Document findings of target species by completing California Native Species Field Survey Form(s) and submit form(s) to the Natural Diversity Data Base. Documentation of determinations and/or voucher specimens may be useful in cases of taxonomic ambiguities, habitat or range extensions.

7. Report as an addendum to the original survey, any change in abundance and distribution of target plants in subsequent years. Project sites with inventories older than three years from the current date of project proposal submission will likely need additional survey. Investigators need to assess whether an additional survey(s) is (are) needed.

8. Adverse conditions may prevent investigator(s) from determining presence or identifying some target species in potential habitat(s) of target species. Disease, drought, predation, or herbivory may preclude the presence or identification of target species in any year. An additional botanical inventory(ies) in a subsequent year(s) may be required if adverse conditions occur in a potential habitat(s). Investigator(s) may need to discuss such conditions.

9. Guidance from California Department of Fish and Game (CDFG) regarding plant and plant community surveys can be found in Guidelines for Assessing the Effects of Proposed Developments on Rare and Endangered Plants and Plant Communities, 1984. Please contact the CDFG Regional Office for questions regarding the CDFG guidelines and for assistance in determining any applicable State regulatory requirements.

ENCLOSURE A

Endangered and Threatened Species that May Occur in or be Affected by

PROJECTS IN SANTA CLARA COUNTY

Reference File No. 1-1-01-SP-887

January 29, 2001

Listed Species

Mammals

- salt marsh harvest mouse, *Reithrodontomys raviventris* (E)
- San Joaquin kit fox, *Vulpes macrotis mutica* (E)
- riparian brush rabbit, *Sylvilagus bachmani riparius* (E) *

Birds

- California brown pelican, *Pelecanus occidentalis californicus* (E)
- California clapper rail, *Rallus longirostris obsoletus* (E)
- California least tern, *Sterna antillarum (=albifrons) browni* (E)
- marbled murrelet, *Brachyramphus marmoratus* (T)
- western snowy plover, *Charadrius alexandrinus nivosus* (T)
- bald eagle, *Haliaeetus leucocephalus* (T)

Reptiles

- San Francisco garter snake, *Thamnophis sirtalis tetrataenia* (E)
- Alameda whipsnake, *Masticophis lateralis euryxanthus* (T)
- Critical habitat, Alameda whipsnake, *Masticophis lateralis euryxanthus* (T)
- giant garter snake, *Thamnophis gigas* (T)

Amphibians

- California red-legged frog, *Rana aurora draytonii* (T)

Fish

- tidewater goby, *Eucyclogobius newberryi* (E)
- winter-run chinook salmon, *Oncorhynchus tshawytscha* (E)
- delta smelt, *Hypomesus transpacificus* (T)
- Central California Coastal steelhead, *Oncorhynchus mykiss* (T)
- South Central California steelhead, *Oncorhynchus mykiss* (T)
- Central Valley spring-run chinook salmon, *Oncorhynchus tshawytscha* (T)
- Critical Habitat, Central Valley spring-run chinook, *Oncorhynchus tshawytscha* (T)
- Sacramento splittail, *Pogonichthys macrolepidotus* (T)

Invertebrates

- vernal pool fairy shrimp, *Branchinecta lynchi* (T)
- bay checkerspot butterfly, *Euphydryas editha bayensis* (T)

Plants

- Tiburon paintbrush, *Castilleja affinis ssp. neglecta* (E)
- Coyote ceanothus, *Ceanothus ferrisae* (E)

Santa Clara Valley dudleya, *Dudleya setchellii* (E)
Metcalf Canyon jewelflower, *Streptanthus albidus ssp. albidus* (E)
robust spineflower, *Chorizanthe robusta* (E) *
Contra Costa goldfields, *Lasthenia conjugens* (E) *
California sea blite, *Suaeda californica* (E) *
showy Indian clover, *Trifolium amoenum* (E) *

Proposed Species

Birds

mountain plover, *Charadrius montanus* (PT)

Candidate Species

Amphibians

California tiger salamander, *Ambystoma californiense* (C)

Fish

Central Valley fall/late fall-run chinook salmon, *Oncorhynchus tshawytscha* (C)

Species of Concern

Mammals

Sierra Nevada red fox, *Vulpes vulpes necator* (CA)
Pacific western big-eared bat, *Corynorhinus (=Plecotus) townsendii townsendii* (SC)
greater western mastiff-bat, *Eumops perotis californicus* (SC)
small-footed myotis bat, *Myotis ciliolabrum* (SC)
long-eared myotis bat, *Myotis evotis* (SC)
fringed myotis bat, *Myotis thysanodes* (SC)
long-legged myotis bat, *Myotis volans* (SC)
Yuma myotis bat, *Myotis yumanensis* (SC)
San Francisco dusky-footed woodrat, *Neotoma fuscipes annectens* (SC)
salt marsh vagrant shrew, *Sorex vagrans halicoetes* (SC)

Birds

little willow flycatcher, *Empidonax traillii brewsteri* (CA)
black rail, *Laterallus jamaicensis coturniculus* (CA)
American peregrine falcon, *Falco peregrinus anatum* (D)
Black-Crowned Night Heron, *Nycticorax nycticorax* (MB)
tricolored blackbird, *Agelaius tricolor* (SC)
grasshopper sparrow, *Ammodramus savannarum* (SC)
Bell's sage sparrow, *Amphispiza belli belli* (SC)
short-eared owl, *Asio flammeus* (SC)
western burrowing owl, *Athene cunicularia hypugea* (SC)
American bittern, *Botaurus lentiginosus* (SC)
ferruginous hawk, *Buteo regalis* (SC)
Costa's hummingbird, *Calypte costae* (SC)

- Lawrence's goldfinch, *Carduelis lawrencei* (SC)
- Vaux's swift, *Chaetura vauxi* (SC)
- lark sparrow, *Chondestes grammacus* (SC)
- olive-sided flycatcher, *Contopus cooperi* (SC)
- hermit warbler, *Dendroica occidentalis* (SC)
- white-tailed (=black shouldered) kite, *Elanus leucurus* (SC)
- Pacific-slope flycatcher, *Empidonax difficilis* (SC)
- common loon, *Gavia immer* (SC)
- saltmarsh common yellowthroat, *Geothlypis trichas sinuosa* (SC)
- least bittern, western, *Ixobrychus exilis hesperis* (SC)
- loggerhead shrike, *Lanius ludovicianus* (SC)
- Lewis' woodpecker, *Melanerpes lewis* (SC)
- Alameda (South Bay) song sparrow, *Melospiza melodia pusillula* (SC)
- long-billed curlew, *Numenius americanus* (SC)
- rufous hummingbird, *Selasphorus rufus* (SC)
- Allen's hummingbird, *Selasphorus sasin* (SC)
- red-breasted sapsucker, *Sphyrapicus ruber* (SC)
- Bewick's wren, *Thryomanes bewickii* (SC)
- California thrasher, *Toxostoma redivivum* (SC)

Reptiles

- silvery legless lizard, *Anniella pulchra pulchra* (SC)
- northwestern pond turtle, *Clemmys marmorata marmorata* (SC)
- southwestern pond turtle, *Clemmys marmorata pallida* (SC)
- San Joaquin coachwhip (=whipsnake), *Masticophis flagellum ruddocki* (SC)
- California horned lizard, *Phrynosoma coronatum frontale* (SC)

Amphibians

- foothill yellow-legged frog, *Rana boylii* (SC)
- western spadefoot toad, *Scaphiopus hammondii* (SC)

Fish

- green sturgeon, *Acipenser medirostris* (SC)
- longfin smelt, *Spirinchus thaleichthys* (SC)

Invertebrates

- Opler's longhorn moth, *Adela oplerella* (SC)
- Ricksecker's water scavenger beetle, *Hydrochara rickseckeri* (SC)
- California linderiella fairy shrimp, *Linderiella occidentalis* (SC)
- unsilvered fritillary butterfly, *Speyeria adiaste adiaste* (SC)

Plants

- Mt. Hamilton harebell, *Campanula sharsmithiae* (SC)
- Mt. Hamilton thistle, *Cirsium fontinale var. campylon* (SC)

South Bay clarkia, *Clarkia concinna ssp. automixa* (SC)
Mt. Hamilton coreopsis, *Coreopsis hamiltonii* (SC)
clustered lady's-slipper, *Cypripedium fasciculatum* (SC)
interior California larkspur, *Delphinium californicum ssp. interius* (SC)
Brandegee's woolly-star, *Eriastrum brandegeae* (SC)
Hoover's button-celery, *Eryngium aristulatum var. hooveri* (SC)
San Francisco wallflower, *Erysimum franciscanum* (SC)
talus fritillary, *Fritillaria falcata* (SC)
fragrant fritillary, *Fritillaria liliacea* (SC)
delta tule-pea, *Lathyrus jepsonii var. jepsonii* (SC)
smooth lessingia, *Lessingia micradenia var. glabrata* (SC)
Gairdner's yampah, *Perideridia gairdneri ssp. gairdneri* (SC)
Mt. Diablo phacelia, *Phacelia phacelioides* (SC)
Salinas Valley popcornflower, *Plagiobothrys uncinatus* (SC)
rock sanicle, *Sanicula saxatilis* (SC)
most beautiful (uncommon) jewelflower, *Streptanthus albidus ssp. peramoenus* (SC)
Mt. Hamilton jewelflower, *Streptanthus callistus* (SC)
alkali milk-vetch, *Astragalus tener var. tener* (SC) *
valley spearscale, *Atriplex joaquiniana* (SC) *
northcoast bird's-beak, *Cordylanthus maritimus ssp. palustris* (SC) *
caper-fruited tropidocarpum, *Tropidocarpum capparideum* (SC) **
pappose spikeweed, *Hemizonia parryi ssp. congdonii* (SC) *
San Francisco Bay spineflower, *Chorizanthe cuspidata var. cuspidata* (SC)

KEY:

(E)	*Endangered*	Listed (in the Federal Register) as being in danger of extinction.
(T)	*Threatened*	Listed as likely to become endangered within the foreseeable future.
(P)	*Proposed*	Officially proposed (in the Federal Register) for listing as endangered or threatened.
(PX)	*Proposed Critical Habitat*	Proposed as an area essential to the conservation of the species.
(C)	*Candidate*	Candidate to become a *proposed* species.
(SC)	*Species of Concern*	Other species of concern to the Service.
(D)	*Delisted*	Delisted. Status to be monitored for 5 years.
(CA)	*State-Listed*	Listed as threatened or endangered by the State of California.
*	*Extirpated*	Possibly extirpated from the area.
**	*Extinct*	Possibly extinct
	Critical Habitat	Area essential to the conservation of a species.

ENCLOSURE A

Endangered and Threatened Species that May Occur in or be Affected by Projects in the Selected Quads Listed Below

Reference File No. 1-1-01-SP-887

January 29, 2001

QUAD : 427B MILPITAS

Listed Species

Mammals

salt marsh harvest mouse, *Reithrodontomys raviventris* (E)

riparian brush rabbit, *Sylvilagus bachmani riparius* (E) *

San Joaquin kit fox, *Vulpes macrotis mutica* (E)

Birds

California clapper rail, *Rallus longirostris obsoletus* (E)

California least tern, *Sterna antillarum (=albifrons) browni* (E)

Reptiles

Alameda whipsnake, *Masticophis lateralis euryxanthus* (T)

Amphibians

California red-legged frog, *Rana aurora draytonii* (T)

Fish

delta smelt, *Hypomesus transpacificus* (T)

Central California Coastal steelhead, *Oncorhynchus mykiss* (T)

winter-run chinook salmon, *Oncorhynchus tshawytscha* (E)

Central Valley spring-run chinook salmon, *Oncorhynchus tshawytscha* (T)

Critical Habitat, Central Valley spring-run chinook, *Oncorhynchus tshawytscha* (T)

Sacramento splittail, *Pogonichthys macrolepidotus* (T)

Invertebrates

bay checkerspot butterfly, *Euphydryas editha bayensis* (T)

Candidate Species

Amphibians

California tiger salamander, *Ambystoma californiense* (C)

Fish

Central Valley fall/late fall-run chinook salmon, *Oncorhynchus tshawytscha* (C)

Species of Concern

Mammals

Pacific western big-eared bat, *Corynorhinus (=Plecotus) townsendii townsendii* (SC)

greater western mastiff-bat, *Eumops perotis californicus* (SC)

small-footed myotis bat, *Myotis ciliolabrum* (SC)
long-eared myotis bat, *Myotis evotis* (SC)
fringed myotis bat, *Myotis thysanodes* (SC)
long-legged myotis bat, *Myotis volans* (SC)
Yuma myotis bat, *Myotis yumanensis* (SC)
San Francisco dusky-footed woodrat, *Neotoma fuscipes annectens* (SC)
salt marsh vagrant shrew, *Sorex vagrans halicoetes* (SC)

Birds

tricolored blackbird, *Agelaius tricolor* (SC)
Bell's sage sparrow, *Amphispiza belli belli* (SC)
western burrowing owl, *Athene cunicularia hypugea* (SC)
ferruginous hawk, *Buteo regalis* (SC)
little willow flycatcher, *Empidonax traillii brewsteri* (CA)
American peregrine falcon, *Falco peregrinus anatum* (D)
saltmarsh common yellowthroat, *Geothlypis trichas sinuosa* (SC)
Alameda (South Bay) song sparrow, *Melospiza melodia pusillula* (SC)

Reptiles

silvery legless lizard, *Anniella pulchra pulchra* (SC)
northwestern pond turtle, *Clemmys marmorata marmorata* (SC)
southwestern pond turtle, *Clemmys marmorata pallida* (SC)
California horned lizard, *Phrynosoma coronatum frontale* (SC)

Amphibians

foothill yellow-legged frog, *Rana boylii* (SC)
western spadefoot toad, *Scaphiopus hammondii* (SC)

Fish

longfin smelt, *Spirinchus thaleichthys* (SC)

Invertebrates

Opler's longhorn moth, *Adela oplerella* (SC)
Ricksecker's water scavenger beetle, *Hydrochara rickseckeri* (SC)

Plants

alkali milk-vetch, *Astragalus tener var. tener* (SC) *
valley spearscale, *Atriplex joaquiniana* (SC) *
northcoast bird's-beak, *Cordylanthus maritimus ssp. palustris* (SC) *

Hoover's button-celery, *Eryngium aristulatum var. hooveri* (SC)
pappose spikeweed, *Hemizonia parryi ssp. congdonii* (SC) *

QUAD : 427C SAN JOSE WEST

Listed Species

Birds

California clapper rail, *Rallus longirostris obsoletus* (E)

Amphibians

California red-legged frog, *Rana aurora draytonii* (T)

Fish

delta smelt, *Hypomesus transpacificus* (T)
Central California Coastal steelhead, *Oncorhynchus mykiss* (T)
winter-run chinook salmon, *Oncorhynchus tshawytscha* (E)
Central Valley spring-run chinook salmon, *Oncorhynchus tshawytscha* (T)
Sacramento splittail, *Pogonichthys macrolepidotus* (T)

Invertebrates

bay checkerspot butterfly, *Euphydryas editha bayensis* (T)

Plants

robust spineflower, *Chorizanthe robusta* (E) *

Candidate Species

Amphibians

California tiger salamander, *Ambystoma californiense* (C)

Fish

Central Valley fall/late fall-run chinook salmon, *Oncorhynchus tshawytscha* (C)

Species of Concern

Mammals

Pacific western big-eared bat, *Corynorhinus (=Plecotus) townsendii townsendii* (SC)
greater western mastiff-bat, *Eumops perotis californicus* (SC)
small-footed myotis bat, *Myotis ciliolabrum* (SC)
long-eared myotis bat, *Myotis evotis* (SC)
fringed myotis bat, *Myotis thysanodes* (SC)
long-legged myotis bat, *Myotis volans* (SC)
Yuma myotis bat, *Myotis yumanensis* (SC)
San Francisco dusky-footed woodrat, *Neotoma fuscipes annectens* (SC)

Birds

- tricolored blackbird, *Agelaius tricolor* (SC)
- Bell's sage sparrow, *Amphispiza belli belli* (SC)
- western burrowing owl, *Athene cunicularia hypugea* (SC)
- ferruginous hawk, *Buteo regalis* (SC)
- little willow flycatcher, *Empidonax traillii brewsteri* (CA)
- American peregrine falcon, *Falco peregrinus anatum* (D)
- saltmarsh common yellowthroat, *Geothlypis trichas sinuosa* (SC)

Reptiles

- silvery legless lizard, *Anniella pulchra pulchra* (SC)
- northwestern pond turtle, *Clemmys marmorata marmorata* (SC)
- southwestern pond turtle, *Clemmys marmorata pallida* (SC)
- California horned lizard, *Phrynosoma coronatum frontale* (SC)

Amphibians

- foothill yellow-legged frog, *Rana boylii* (SC)
- western spadefoot toad, *Scaphiopus hammondii* (SC)

Fish

- longfin smelt, *Spirinchus thaleichthys* (SC)

Invertebrates

- Opler's longhorn moth, *Adela oplerella* (SC)
- Ricksecker's water scavenger beetle, *Hydrochara rickseckeri* (SC)
- unsilvered fritillary butterfly, *Speyeria adiaste adiaste* (SC)

KEY:

(E)	*Endangered*	Listed (in the Federal Register) as being in danger of extinction.
(T)	*Threatened*	Listed as likely to become endangered within the foreseeable future.
(P)	*Proposed*	Officially proposed (in the Federal Register) for listing as endangered or threatened.
(PX)	*Proposed Critical Habitat*	Proposed as an area essential to the conservation of the species.
(C)	*Candidate*	Candidate to become a *proposed* species.
(SC)	*Species of Concern*	May be endangered or threatened. Not enough biological information has been gathered to support listing at this time.
(MB)	*Migratory Bird*	Migratory bird
(D)	*Delisted*	Delisted. Status to be monitored for 5 years.
(CA)	*State-Listed*	Listed as threatened or endangered by the State of California.
(*)	*Extirpated*	Possibly extirpated from this quad.
(**)	*Extinct*	Possibly extinct.
	Critical Habitat	Area essential to the conservation of a species.

Appendix E

Alviso Baylands Biological Resources Evaluation

LOWER GUADALUPE RIVER FLOOD PROTECTION PROJECT ADMINISTRATIVE DRAFT EIR BIOLOGICAL RESOURCES, BAYLANDS SECTION

Prepared by

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July 20, 2001

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BIOTIC HABITATS

The reconnaissance study conducted in 2000 identified a series of biotic habitats within the Reconnaissance Study Area. Potential impacts to biological resources due to induced flooding from the Lower Guadalupe River Flood Protection Project (LGR project) occur within a subset of that study area. That subset, and the habitats therein, are shown in Figure 1.

The zone of potential project impacts within the Reconnaissance Study Area comprises seven habitat types. These include: tidal salt marsh, diked salt marsh, brackish marsh, freshwater marsh, salt ponds, aquatic habitat of the slough channels (estuarine), and ruderal habitat associated with levees and other uplands. Figure 1 represents habitats within the Reconnaissance Study Area as presented in the Draft Reconnaissance Report (Northwest Hydraulic Consultants, June 2000) and has been updated here to reflect the ground truthing of habitats conducted 5 February 2001 within the zone of potential project impacts. The habitats of Guadalupe Slough have not been studied in detail as Alviso, Artesian, and Mud sloughs have been in the past decade, but the recent ground reconnaissance revealed similar habitats.

SALT PONDS

Vegetation. The salt ponds comprise most of the zone of potential project impacts. The predominant vegetation in the salt ponds was the microalgal species, *Enteromorpha* (with some *Ulva* spp). *Enteromorpha* was most abundant in ponds A9 and A10, with an average cover of 40% and 12%, respectively, of the surface of these ponds during summer and fall (Lonzarich 1989). Compared to summer and fall, surface coverage by *Enteromorpha* during winter and spring decreased by about 50%. *Enteromorpha* occurred in low abundance, or was absent, in the ponds of high salinity. Pickleweed is the only flowering plant that can occasionally be found along the perimeter of the ponds, depending on their salinity. Most flowering plants are otherwise restricted to near the top of the levee banks, if at all present.

Wildlife. The salt ponds provide habitat for a number of species, especially water birds and shorebirds and a number of studies have been conducted to assess the extent of use of these ponds by various species. In general, birds found to use the ponds extensively comprise ducks, grebes, shorebirds, gulls, and terns. Species composition varies considerably between ponds, however, often as a function of salinity. For example, dabbling ducks, coots, and piscivorous species occur most frequently in less saline ponds such as intake ponds (Anderson 1970), while diving ducks, grebes, phalaropes and Bonaparte's Gulls forage in ponds that exhibit higher salinities. Shorebirds appear to use the ponds across a wider range of salinity than most other species groups (Anderson 1970).

Although artificial, salt ponds have been found to be relatively important to a variety of species. In addition to the saline-tolerant species that use the salt ponds rather extensively (e.g., Snowy Plover, Black-necked Stilt, American Avocet, and phalaropes), they provide roosting habitat for large numbers of migrant and wintering species and nesting habitat for several colonial waterbirds. For example, one bay-wide study found that the largest numbers (seventy percent of the total throughout the system) of shorebirds in the estuary system were in the South Bay

(Stenzel and Page 1988). The majority of these birds foraged on tidal flats but most sought refuge in the salt ponds as the rising tide covered the flats. Stenzel and Page (1988) reported over 296,000 *Calidris* sandpipers during high-tide counts in the salt ponds south of the Dumbarton Bridge and one count of over 240,000 small sandpipers in one pond between Alviso and Guadalupe Sloughs.

The addition of several species to the breeding avifauna (e.g., Black-necked Stilt, American Avocet, California Gull, Forster's Tern, Caspian Tern, and Black Skimmer) of the South Bay has been attributed to the conversion of salt marsh to salt ponds (Gill 1977, Shufford and Ryan 2000).

The analysis of potential impacts of the LGR project on the Baylands study area relies upon an understanding of the ecology of the salt ponds, especially the distribution of breeding birds, and the general distribution of birds when foraging or roosting. The following descriptions are summaries of a more detailed discussion that is presented within the Reconnaissance Study (Appendix ___).

Salt Ponds West of Guadalupe Slough

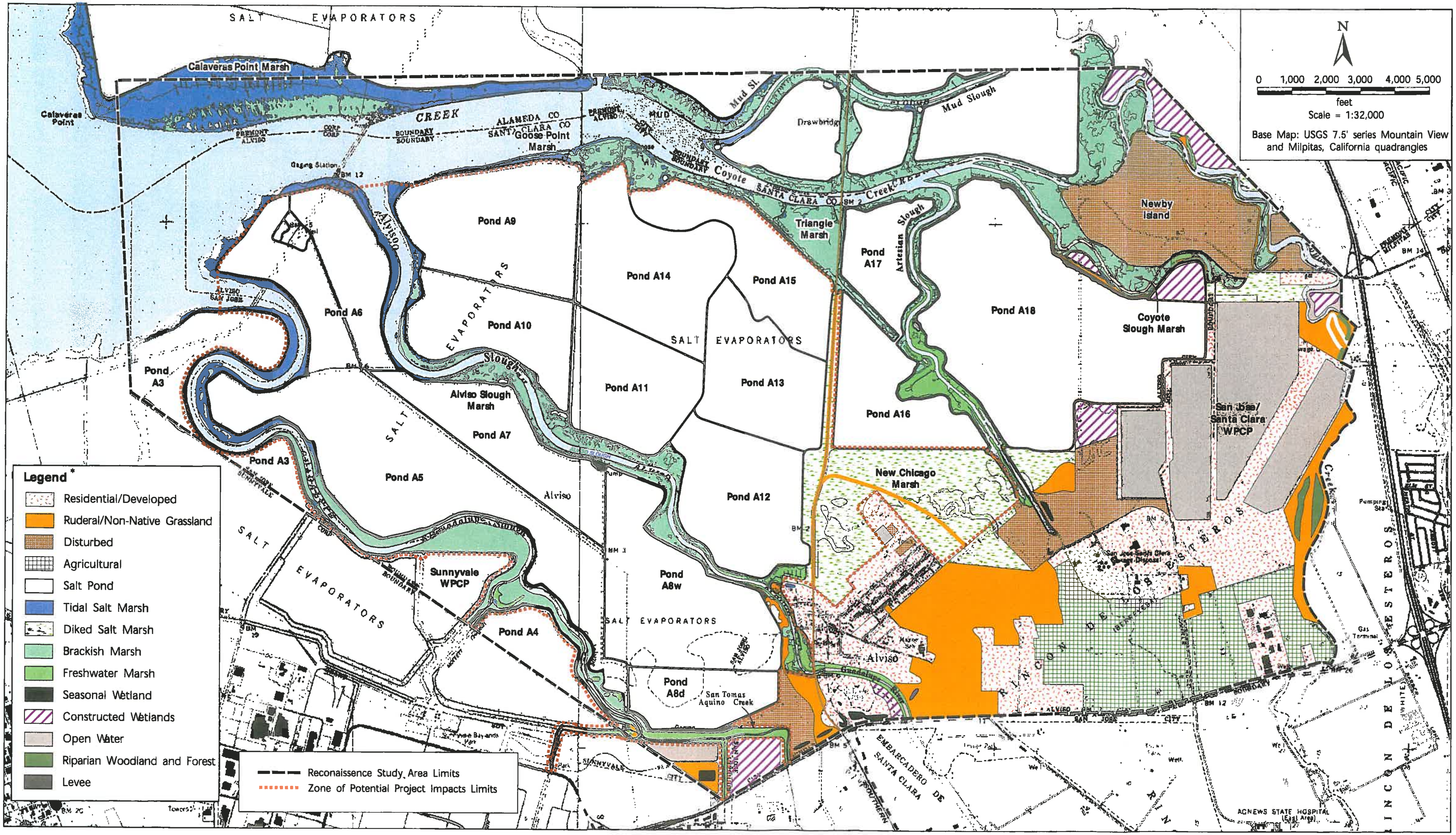
Pond A3 – Many foraging ducks and herons are present in Pond A3. During late summer and fall when the water levels are drawn down slightly, many shorebirds forage and roost at this site. There are many nesting ducks at the margins of this pond. This is among the easternmost of the complex of ponds that are important to post-breeding Least Terns. Snowy Plovers have nested in the northern portions of this pond. American Avocets and Black-necked Stilts nest on duck blinds within the pond.

SWPCP – The Sunnyvale Water Pollution Control Plant has large numbers of foraging ducks, shorebirds, terns and gulls. There are few American Avocets and Black-necked Stilts; this is because of a feral cat colony (located within the rubble and riprap around the ponds) that is maintained by daily feeding. There are large numbers of nesting ducks at this pond.

Pond A4 – Only a moderate number of foraging gulls, terns and waterfowl are present in Pond A4. Large numbers of waterfowl and grebes, mainly Ruddy Duck, Northern Shoveler, Scaup, Western and Clark's Grebes are present at Pond A4 during the winter months. During the spring Canada Goose, Mallard and Gadwall nest on the levees and islands. In the late summer and fall American White Pelican and low numbers of Brown Pelican roost on the islands and forage within the pond. In some years, an algal mat forms on the pond in the late summer attracting large numbers of foraging herons, terns and shorebirds (Ryan 2000).

Salt Ponds Between Guadalupe Slough and Alviso Slough

Pond A5 – Snowy Plovers have been recorded at the shallow northern end of Pond A5 since the 1970's, and may nest there (see Listed Species, below). Large numbers of foraging and roosting waterfowl, shorebirds, gulls, terns, ardeids, and pelicans also use Pond A5. In the fall, winter and spring, large numbers of shorebirds and ducks roost and forage in the shallow northern end of the pond. Forster's Terns nest on islands and on duck blinds. This pond also



Jones & Stokes

H.T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

Figure 1
Habitat Map

* Data Courtesy of City of San Jose, Environmental Services Department

supports many nesting avocets and stilts, and ducks. Large numbers of Wilson's and Red-necked Phalaropes use this pond as a migratory stopover in the fall. The high bird abundance and diversity is due to habitat diversity, with some deepwater areas, but also much shallow water and mud, especially during summer and fall (S. Rottenborn, pers. comm., T. Ryan, pers. comm., Ryan 2000).

Pond A6 (FWS) – This "pond" is usually dry, but partially fills with rainwater during wet years. The channels around the pond periphery contain water year-round in most years, providing foraging habitat for shorebirds, gulls, terns, and ducks. Snowy Plovers nest on the salt pan and levees; this use is described in the Listed Species section of this report. The Pond A6 area has the largest California Gull colony in the San Francisco Bay area and the second largest in the state (Shuford and Ryan 2000). Other nesting birds include Western Gull, American Avocet and Black-necked Stilt. Commonly known as the Knapp parcel, the USFWS has discussed tidal restoration for the site.

Pond A7 – Species occurrence in this pond is similar to that of A5, but bird abundance probably averages lower. Islands in Pond A7 support what is probably the only Caspian Tern colony in Santa Clara County. The northwest end often has exposed mud in summer and fall, providing foraging and roosting habitat for shorebirds. The northwest end often has exposed mud in summer and fall, providing foraging and roosting habitat for shorebirds.

Pond A8D (southern section of A8) – Currently an "out of service" pond, this pond was the most species-rich pond of four upland ponds studied between 1998–2000 (Ryan 2000). Large numbers of shorebirds use the pond when the salt pan is inundated. Ducks, including Bufflehead, Scaup and Common Goldeneye use the channels within the pond during the winter. Snowy Plover are known to nest on the salt pan; use is described in the Listed Species section of this report. This pond supports some nesting by American Avocets and Black-necked Stilts. Moderate numbers of swallows forage over this pond during the spring and summer; occasionally, large flocks are observed on adjacent wires during migration. Upland areas support winter sparrow flocks. Some foraging by nonbreeding shorebird occurs, although there is little water in this pond.

Pond A8W (northern section of A8) – Snowy Plover use is described in the Listed Species section of this report. In general, due to higher volumes of water compared to A8D, there are fewer nesting Snowy Plovers. However, higher numbers of Snowy Plovers forage and roost here during the winter months. Large numbers of American Avocets as well as Canada Geese, Mallards, Gadwalls, and Black-necked Stilts nest on degraded levees within the pond. Forster's Terns breed here occasionally. Barn Swallows nest on abandoned duck blinds. Moderate numbers of ducks, gulls, terns, and non-breeding shorebirds roost and forage here. Peregrine Falcons roost and forage at this pond, less frequently in recent years. Occasionally small numbers of Brown Pelicans occur here.

Salt Ponds Between Alviso Slough and Artesian Slough

Pond A9 – Pond A9 supports the largest numbers and diversity of waterbirds of any pond in the Lower Guadalupe study area, including large numbers of diving and dabbling ducks from winter through spring. Drawn down somewhat in late summer and fall, the exposed mud is used by thousands of roosting and foraging shorebirds, and appreciable numbers of pelicans and cormorants. This pond is one of the primary feeding areas for herons nesting at the Artesian Slough heronry, especially during the heron-nesting period. Some American Avocets and Black-necked Stilts nest on levees.

Pond A10 – This pond is used for foraging by many more waterfowl (particularly diving ducks such as Greater and Lesser scaup, Canvasbacks, and Ruddy Ducks) than A11–13 (see below). It also provides foraging, roosting, and bathing habitat for moderate numbers of gulls. The levee between A10 and A9 is used as a nesting area by California Gulls and is the third largest colony in South San Francisco Bay (Shuford and Ryan 2000). Since 1998, Double-crested Cormorants nested on this levee (the only ground-nesting cormorants in the South Bay).

This levee, and the pond, is often used by large numbers of roosting and foraging White and Brown pelicans. Some American Avocets and Black-necked Stilts nest on levees. Moderate numbers of shorebirds forage on levees, but A11–12 are always full of water, with no exposed mud in the ponds' interiors.

Ponds A11, 12, and 13 – These ponds provide foraging for moderate numbers of diving ducks (mostly Lesser and Greater scaups, Bufflehead, American Goldeneye, canvasbacks and Surf Scoter), dabbling ducks (mostly Gadwalls, Shovelers, and a few Mallards), Ardeids (along levees), Grebes (mostly Eared, some Western/Clark's), a few White and Brown pelicans (forage in ponds, roost on levees), and Double-crested Cormorants (forage in ponds, roost on levees). Some American Avocets and Black-necked Stilts nest on levees. Large numbers of gulls roost and bathe here. Some shorebirds forage on levees, but ponds A11-12 are always full of water, with no exposed mud in the ponds' interiors.

Pond A14 – This pond supports low species diversity due to its high salinity, but many Eared Grebes, smaller species of gulls, and occasionally large numbers of Phalaropes forage there, presumably on brine shrimp. Roosting and foraging shorebirds occur there when the water is drawn down in summer and fall. Some American Avocets and Black-necked Stilts nest on levees.

Pond A15 – Like A14, this pond supports low bird diversity due to its high salinity. Many foraging Eared Grebes, gulls, and Red-breasted Mergansers use Pond A15. Some American Avocets and Black-necked Stilts nest on levees. Some shorebirds forage on the levees, but A11-12 is always full of water, with no exposed mud in the ponds' interiors.

Small impoundment between Pond A12 and railroad tracks – This area supports foraging shorebirds and roosting gulls. Snowy Plovers have attempted to nest here. Avocets and stilts have nested here in many years.

Pond A16 – Due to the pond's high salinity, bird species diversity is low here, but it is used by many foraging Eared Grebes, gulls, Red-breasted Mergansers, and sometimes by Phalaropes. The islands occurring within this pond support large numbers of nesting

Forster's Terns, American Avocets, Black-necked Stilts. Currently, it is the second largest breeding colony of Forster's Terns in South San Francisco Bay (Ryan and Dakin in prep.). Black Skimmers have been recorded in tern colonies in summer and nested here in 2000 (SFBBO unpubl.). The largest heronry in Santa Clara County is located along Artesian Slough on the northeast side of A16 (many Great and Snowy Egrets, Black-crowned Night-Herons, usually a few American Bittern, Little Blue Herons and Cattle Egrets, rarely nesting White-faced Ibis).

TIDAL SALT MARSH

Vegetation. Tidal salt marsh is located along the downstream portions of Alviso and Guadalupe sloughs, between ponds A3, A6, and A9. Patches of this salt marsh could also be found further upstream where eddies occurred along the slough channels. The dominant plant species of this habitat type are pickleweed (*Salicornia virginica*), cordgrass (*Spartina foliosa*), and saltgrass (*Distichlis spicata*). Alkali bulrush (*Scirpus robustus*) can occasionally be found in this habitat near the transition zones with brackish marsh.

Wildlife. Tidal salt marsh provides valuable habitat for wildlife. Tidal marshes of the San Francisco Bay estuarine system support several endemic vertebrates, including the California Clapper Rail (*Rallus longirostris obsoletus*), a federal and state endangered species, the salt marsh harvest mouse (*Reithrodontomys raviventris*), also listed as endangered at both levels, and the Alameda Song Sparrow (*Melospiza melodia pusillula)* a state "Species of Special Concern." In general, these tidal marshes receive heavy use by migrant and wintering shorebirds that feed on mud flats exposed by receding tidal flow and roost in *Salicornia* patches during high tides. Such species include Greater and Lesser yellowlegs (*Tringa melanoleuca* and *T. flavipes*), Willet (*Catoptrophorus semipalmatus*), Marbled Godwit (*Limosa fedoa*), Western and Least sandpipers (*Calidris mauri* and *C. minutilla*), Dunlin (C. alpina), and both species of dowitcher (*Limnodromus griseus* and *L. scolopaceus*). Other species found foraging in tidal salt marsh throughout the year include several resident ardeids such as the Great Blue Heron (*Ardea herodias*), Great and Snowy egrets (*A. alba, Egretta thula*), and Black-crowned Night Heron (*Nycticorax nycticorax*).

This habitat supports several species of small mammals, including the above-mentioned salt marsh harvest mouse, a species closely associated with *Salicornia*; the salt marsh wandering shrew (*Sorex vagrans halicoetes*), a California Species of Special Concern; and the California vole (*Microtus californicus*). Larger mammals such as red fox (*Vulpes vulpes*) and raccoons (*Procyon lotor*) wander out on tidal flats in search of food.

DIKED SALT MARSH

Vegetation. Most of the diked salt marsh within the zone of potential project impacts is located in New Chicago Marsh. Diked salt marsh refers to areas of salt marsh without tidal action or with regulated tides. However, New Chicago Marsh can be subject to tidal influence through the New Chicago Marsh canal that connects with Coyote Creek. In order to periodically flush New Chicago Marsh, the U.S. Fish and Wildlife Service opens the tide gate to the marsh reportedly in mid- or late May. The gate remains open until the rainy season begins, normally in late October or early November, but the amount of tidal water that enters New Chicago Marsh does not keep pace with evaporation, so the marsh is never fully flushed. In addition to New Chicago Marsh, there are also pools isolated from the slough channels and salt ponds that support pickleweed along their margins, particularly adjacent to Pond A8D.

The diked salt marsh habitat supports a wide variety of vegetation. The composition and quality of the vegetation is variable throughout the area, ranging from relatively pure stands of salt marsh species, including pickleweed, alkali heath (*Frankenia salina*), and salt grass, to mixed salt marsh/grassland areas supporting pickleweed and annual grasses such as rabbitsfoot grass (*Polypogon monspeliensis*), Italian ryegrass (*Lolium multiflorum*), and Mediterranean barley (*Hordeum marinum*).

Wildlife. These diked salt marshes support large, diverse avian species assemblages at various times of year. In winter, large flocks of gulls roost in ponded areas of New Chicago Marsh where over ten species have been recorded. The site also supports large numbers of foraging shorebirds when inundated. Raptors such as the endangered Peregrine Falcon (*Falco peregrinus anatum*), the Merlin (*Falco columbarius*), the Northern Harrier (*Circus cyaneus*), and the Barn Owl (*Tyto alba*) forage over these diked salt marshes.

Mammal species in this habitat are similar to those in tidal salt marsh and thus, include the salt marsh harvest mouse, the salt marsh wandering shrew and the California vole. These habitats are also used relatively extensively by egrets and herons for foraging and roosting. Finally, large numbers of waterfowl occur on these areas when ponded.

BRACKISH MARSH

Vegetation. Brackish marsh is the most common marsh habitat encountered in Guadalupe and Alviso Sloughs, as well as throughout the Reconnaissance Study Area. The dominant plant species of the brackish marsh habitat include alkali bulrush, California bulrush (*Scirpus californicus*), and perennial peppergrass (*Lepidium latifolium*). Pickleweed, spearscale (*Atriplex triangularis*), and cordgrass can occasionally be found in this habitat near the transition zones with tidal salt marsh.

Wildlife. The endangered California Clapper Rail occurs in brackish marshes on the project site. This species is typically associated with salt marsh, but has been found in brackish marshes at this, and other, locations throughout the year. Although the species breeds in brackish marshes, there have been no studies addressing survivorship and reproductive success of these birds relative to California Clapper Rails that breed in tidal salt marsh. In general, brackish marsh supports species typical of freshwater marsh, and, as with the Clapper Rail, some species more typically associated with saltier marshes. The transitional nature of the habitat is reflected in the animal species it supports.

FRESHWATER MARSH

Vegetation. Freshwater marsh occurs in the upstream portions of Guadalupe and Alviso Sloughs approximately where they are adjacent with ponds A4 and A8W respectively. The dominant plant species of the freshwater marsh habitat are California bulrush, tule (*Scirpus acutus* var. *occidentalis*), and cattail (*Typha* spp.). Alkali bulrush sometimes occurs in this habitat near the margins with the levees. Tule becomes the dominant species upstream of the salt pond elevation, in Calabazas and San Tomas Aquino Creeks, and the Guadalupe River.

Wildlife. Freshwater marsh dominated by bulrush, tule and cattail in the project site provides habitat for a variety of birds. Species such as the Pied-billed Grebe (*Podilymbus podiceps*), Gadwall (*Anas strepera*), Mallard (*A. platyrhynchos*), Common Moorhen (*Gallinula chloropus*), American Coot (*Fulica americana*), Spotted Sandpiper (*Actitis macularia*), Common Snipe (*Gallinago gallinago*), Marsh Wren (*Cistothorus platensis*), Salt Marsh Common Yellowthroat (*Geothlypis trichas sinuosa*), a California Species of Special Concern, and Red-winged Blackbird (*Agelaius tricolor*), breed in this habitat and can be found throughout the year. Other resident species that forage in the freshwater marsh on site include the herons and egrets mentioned under the tidal marsh habitat section. Northern Harriers (*Circus cyaneus*) often forage over the site, especially during the winter months. Other species, such as Virginia Rail (*Rallus limicola*) and Sora (*Porzana carolina*) are common in migration and winter in freshwater marsh on the site. Several species of swallows and Black Phoebes (*Sayornis nigricans*) forage for aerial insects concentrated over the water and emergent vegetation, and Forster's Terns forage for fish in open water during the summer months. In winter, various species of sparrows, including Song, Lincoln's, (*M. lincolnii*), and White and Golden-crowned (*Zonotrichia leucophrys* and *Z. atricapilla*) forage and roost in the emergent vegetation.

Freshwater marshes support other vertebrate species as well, although few species of amphibians occur this far downstream. The most prominent amphibian in these marshes is the Pacific treefrog (*Hyla regilla*). Larger mammals such as the red fox, coyote (*Canis latrans*), raccoon, and opossum (*Didelphis virginiana*) search the fringes and openings of these marshes for food. Smaller mammals associated with this habitat include muskrats (*Ondatra zibethicus*), California voles and western harvest mouse (*R. megalotis*).

LEVEES

Vegetation. Levees occur throughout the zone of potential project impacts and the Reconnaissance Study Area, both along the slough channels and between the salt ponds. The levees consist of the silty sediments excavated from borrow ditches within the salt ponds. The salinity of these sediments precludes the establishment of most vegetation on top of most of the levees and along their banks with the salt ponds. The levee banks along the slough channels are buffered by both tidal and fresh waters and support a range of plant species dominated by halophytes in the mid- to downstream portions of the sloughs, to ruderal upland species along the upstream portions. However, halophytic species may occur along the levees wherever salinity requirements are met, regardless of elevation or proximity to the bay. The changes in salinity, and in levee elevation, however slight, afford dramatic changes in plant composition along the levees, as well as greater diversity than in the adjacent marsh habitats.

Typical halophytic species occurring along levees include slender-leaved iceplant (*Mesembryanthemum modiflorum*), New Zealand spinach (*Tetragonia tetragonioides*), Australian saltbush (*Atriplex semibaccata*), alkali heath (*Frankenia salina*), sand spurrey

(*Spergularia macrotheca*), and saltgrass, among others. Plant species occurring along upstream levees and/or at higher elevations include bristly ox-tongue (*Picris echioides*), small-pod mustard (*Hirschfeldia incana*), black mustard (*Brassica nigra*), poison hemlock (*Conium maculatum*), bromes (*Bromus* spp.), and Italian thistle (*Carduus pycnocephalus*). Shrub elements of inland riparian habitats also occur along the upstream areas of the sloughs, and include coyote brush (*Baccharis pilularis*) and tree-tobacco (*Nicotiana glauca*).

Wildlife. Levees provide habitat for a number of avian species. The habitat value of the levees in the project site is greatly enhanced by the adjacent bay and riverine habitats and the salt ponds. Several shorebirds, including Killdeer (*Charadrius vociferous*), the federally threatened Western Snowy Plover (*Charadrius alexandrinus nivosus*), Black-necked Stilts, and American Avocets, breed on levees close to appropriate foraging areas. A number of shorebird species that forage on bay tidal mud flats utilize levees to roost during high tide. The second largest breeding colony of California Gulls (*Larus californicus)* occurs on abandoned levees in a salt pond at the Knapp property; the breeding colonies of this species are of Special Concern. Abandoned levees provide important nesting substrate for other colonial larids including Caspian and Forster's terns (*Sterna caspia* and *S. forsteri*). Levees adjacent to the riverine habitats of the site have supported another Species of Special Concern that receives a significant amount of attention in the region, the Western Burrowing Owl (*Athene cunicularia hypugea*). Other species use the levees for foraging and roosting as well. These species include wintering and migrating American Pipits (*Anthus rubescens*) and Horned Larks (*Eremophila alpestris*), Savannah Sparrows (*Passerculus sandwichensis*), various blackbirds and others, especially in areas were vegetation has become established.

The outboard side of levees provides important escape cover for a variety of species, notably the salt marsh harvest mouse. A percentage of the population moves onto levees during extreme tide or high water events. California Clapper Rails are also known to move to high ground on levees. Other mammals that occur on these levees include California Ground Squirrels, red foxes, skunks, and raccoons.

AQUATIC

Vegetation. Aquatic habitat occurs within the slough channels, salt ponds, and remnant slough channels within diked salt marsh. This habitat also includes isolated ponds forming diked salt marsh (in and around the marina), and other miscellaneous pools associated with levees, surrounded by marsh, or excavated in uplands. Vegetation within these aquatic habitats is limited to species that can withstand inundation, and include most of those species occurring in marshes as described above. Therefore, cordgrass, alkali bulrush, and tule are commonly inundated from salt marsh through freshwater marsh. No other emergent vegetation can be expected to occur in the steadily moving waters of the sloughs, or in the hypersaline waters of the salt ponds.

Wildlife. Aquatic habitats within the project area support a very diverse array of shorebirds and water birds, in part due to the diversity of aquatic habitats present within the area. Bird use of the salt ponds is discussed above under that topic and other wetland-associated species that occur in aquatic habitats are listed under the tidal and freshwater marsh habitat descriptions also presented above. In addition, a number of species occur in the open channels and other miscellaneous pools in the project area. Examples of such species include: migrant and wintering Western and Clark's grebes (*Aechmophorus occidentalis* and *A. clarkii*), resident Double-crested Cormorants (*Phalacrocorax auritus*), and a number of ducks, including American Widgeon (*A. Americana*), Cinnamon Teal (*A. cyanoptera*), Northern Shoveler (*A. clypeata*), Northern Pintail (*A. clypeata*), Green-winged Teal (*A. crecca*), and Lesser Scaup (*Aythya affinis*), among others. Aquatic habitat supports a large number of shorebird species. Shorebird species composition within aquatic microhabitats varies depending upon water depth and salinity, bottom substrate, and location. These species are listed in Appendix B, which presents a complete list of species that typically use habitats in the project area. Large numbers of larids forage and roost in these areas, including the terns mentioned above that plunge dive to capture fish and large aquatic invertebrates. In winter, some eight species of gulls (*Larus* sp.) occur commonly in these habitats on site bathing in fresher water and resting on virtually any open water on site.

Harbor Seals (*Zalophys californicus*) are known to occasionally move into the sloughs of the vicinity, although there are no traditional haul-out locations within the study area.

SPECIAL-STATUS PLANT AND WILDLIFE SPECIES

Information concerning threatened, endangered, or other special-status species that may occur in the area was collected from several sources and reviewed by H. T. Harvey & Associates' biologists. The sources consulted included the California Department of Fish and Game's (CDFG) Natural Diversity Data Base (CNDDB 1999, 2000), California Wildlife Habitat Relationships species notes (CDFG 1988, 1990a, 1990b), and miscellaneous information available through the U.S. Fish and Wildlife Service (USFWS), CDFG, and technical publications. The California Native Plant Society (CNPS) *Inventory of Rare and Endangered Vascular Plants of California* (Skinner and Pavlik 1994) and *The Jepson Manual* (Hickman 1993) supplied information regarding the distribution and habitats of vascular plants in the vicinity.

A search of published accounts of these species was conducted for the United States Geologic Service (USGS) Mountain View and Milpitas quadrangle areas, in which the project site occurs, and for the ten surrounding quadrangles including: Newark, Niles, Redwood Point, La Costa Valley, Palo Alto, Mindego Hill, San Jose East, San Jose West, Cupertino, and Calaveras Reservoir (CNDDB 2000). All species listed as occurring in Santa Clara County and present on CNPS Lists 1A, 1B, 2, or 4 were also reviewed.

SPECIAL-STATUS PLANT SPECIES

Reconnaissance-level surveys were conducted along Guadalupe Slough, and areas around salt Pond A8D and New Chicago Marsh to conduct ground truthing of habitats in these areas. Surveys to assess the suitability of the study area to support special-status plant species throughout the Reconnaissance Study Area were conducted prior to June 2000 by H.T. Harvey and Associates (H.T. Harvey & Associates, Reconnaissance Study for Lower Guadalupe River, March 2000). The recent surveys did not reveal any habitats capable of supporting additional special-status plant species other than those identified in that study. This study is therefore a re-assessment of the potential occurrence of the six species previously considered. These species include Congdon's Tarplant (*Centromadia parryi* ssp. *congdonii*), Point Reyes Bird's Beak (*Cordylanthus maritimus* ssp. *palustris*), Marsh Gumplant (*Grindelia stricta* var. *angustifolia*), Delta Tule Pea (*Lathyus jepsonii* var. *jepsonii*), Hairless Popcorn flower (*Plagiobothrys glaber*), and California Seablite (*Suaeda californica*).

A new query of the California Natural Diversity Database (CNDDB 2000) was performed to identify recent occurrences of these species within the specified quadrangle areas. The query also identified other species occurring within similar habitats in the area. Specific CDFG habitat elements identified in this query included aquatic, artificial standing waters, brackish marsh, freshwater marsh, salt marsh, marine intertidal and splash zone communities, marine bay, mud shores and flats, and wetlands. These habitats were chosen for the similarity of their constituent species to those on site, as well as the proximity of the site to all such habitats. The only sensitive habitat identified in the CNDDB query was northern coastal salt marsh, which is extensive with the Reconnaissance Study Area.

No additional species were considered upon assessment of the query. The most recent state and federal listing update according to the California Department of Fish and Game (CDFG 2000) was also consulted to verify the status of the above species and identify any other recently listed species. One species, marsh gumplant, has since been de-listed by the CNPS, and is omitted from further consideration here. Descriptions of the five remaining special-status plants species potentially occurring on site are given below and an overview of their status and habitat preferences is given in Table 1.

California Seablite (*Suaeda californica*). Federal Listing Status: Endangered; State Listing Status: None; CNPS List: 1B. This evergreen shrub occurs in the upper margins of coastal salt marshes. The blooming period extends from July to October. The range of this species includes Alameda, Santa Clara, and San Luis Obispo counties, but it is believed to be extirpated from the former counties. The CDFG Rarefind Database has only historic reports of this species in Alameda County near San Leandro in 1958 and in Santa Clara County on salt flats near the Palo Alto Yacht Harbor in 1971. Within the zone of potential project impacts, the tidal marshes bordering Coyote Creek, Alviso Slough, and Guadalupe Slough contain suitable habitat for this species. However, since this species is likely extirpated from San Francisco Bay, it is presumed absent.

Congdon's Tarplant (*Centromadia parryi* ssp. *congdonii*). Federal Listing Status: None; State Listing Status: None; CNPS List: 1B. This annual herb occurs in valley and foothill grassland, particularly those with alkaline substrates, and in sumps or disturbed areas where water collects. The blooming period extends from June through November. The range of this species includes Alameda, Monterey, San Luis Obispo, and Santa Clara counties, and it has been extirpated from three others. The CDFG Rarefind Database has no reports of this species within the quadrangle search area; however, this species has been observed in Alviso. Surveys for this species during the blooming period are warranted along levees, within ditches, and in mesic ruderal uplands within and adjacent to the Reconnaissance Study Area.

Delta Tule Pea (*Lathyus jepsonii* var. *jepsonii*). Federal Listing Status: None; State Listing Status: None; CNPS List 1B. This perennial herb occurs in brackish and freshwater marshes between sea level and 30 meters. The blooming period extends from May to June. The range of this species includes Solano and nine other surrounding counties including Santa Clara County. The CDFG Rarefind Database has no reports of this species within the quadrangle search area. While salt and brackish marshes and other wetlands within the Reconnaissance Study Area offer suitable habitat for this species, this species is presumed absent in Alviso and Guadalupe Sloughs.

Hairless Popcorn flower (*Plagiobothrys glaber*). Federal Listing Status: None; State Listing Status: None; CNPS List 1A. This annual herb occurs in alkaline meadows and coast salt marsh. The blooming period extends from April to May. The historic range of this species includes Alameda, Merced, Marin, San Benito, and Santa Clara counties, but the plant is now believed to be extirpated from all these counties. The CDFG Rarefind Database has only three historic records for this species within the quadrangle search area, the most recent of which dates from 1955. While salt and brackish marshes and other wetlands within the Reconnaissance

Table 1. Special-status plant and animal species, their status, and potential occurrence on the Baylands Portion of the Lower Guadalupe River Project Site, Alviso, San Jose and Sunnyvale, California.

NAME	*STATUS	HABITAT	POTENTIAL FOR OCCURRENCE ON SITE
Federal or State Endangered Species			
California Seablite (*Suaeda californica*)	FE, 1B	Coastal salt marshes and swamps.	Suitable habitat exists on site; no nearby extant populations; presumed absent.
Bald Eagle (*Haliaeetus leucocephalus*)	FPD, FT, SE, SP	Occurs mainly along seacoasts, rivers and lakes; nests in tall trees or in cliffs. Feeds mostly on fish.	Observed on site; occasionally individuals, mostly juveniles are observed in the area during the winter months.
American Peregrine Falcon (*Falco peregrinus anatum*)	SE, SP	Forages in many habitats; requires cliffs for nesting.	Observed on site; regular forager, primarily during migration and winter. Not known to breed at the site.
California Clapper Rail (*Rallus longirostris obsoletus*)	FE, SE, SP	Salt marsh habitat dominated by pickleweed and cordgrass.	Resident and breeds in downstream areas; less common upstream past Alviso Marina in Alviso Slough and upstream of the Sunnyvale West Channel junction in Guadalupe Slough. Occasional fall wanderer to UPRR and upstream of Sunnyvale East Channel.
California Least Tern (*Sterna antillarum browni*)	FE, SE, SP	Nests along the coast on bare or sparsely vegetated, flat substrates.	Observed on site. Occasional forager during post-breeding dispersal. Often occurs when large algal mats form on the salt ponds. Not known to breed on site.
California Brown Pelican (*Pelecanus occidentalis californicus*)	FE, SE, SP	Occurs in coastal areas, cliffs, shores, sloughs, coastal river deltas, and occasionally in inland lakes.	Regular nonbreeding forager in the salt ponds including A5, A7, and A9-A16; less frequently in ponds A14-16. Roosts on levees in the interior of the pond complex.
Willow Flycatcher (*Empidonax traillii*)	FE (*extimus*) SE (*traillii ssp.*)	Breeds locally in riparian habitats in mountains and southern deserts.	Observed on site. Uncommon migrant; those occurring on site are probably not the *extimus* or *brewsteri* subspecies.
Salt Marsh Harvest Mouse (*Reithrodontomys raviventris*)	FE, SE, SP	Salt marsh habitat dominated by pickleweed.	Occurs in pickleweed on the project site. Known from the New Chicago Marsh and tidal salt marshes in the vicinity.
Federal or State Threatened Species			
Steelhead Rainbow Trout California Central Coast ESU (*Oncorhynchus mykiss*)	FT	Cool streams with suitable spawning habitat and conditions allowing migration.	Known to be present in South Bay creeks and slough channels on or adjacent to the site. Suitable spawning habitat is not likely on the project site, but this species moves through the site to spawn upstream.
California Red-legged Frog (*Rana aurora draytonii*)	FT, CSSC	Streams, freshwater pools and ponds with overhanging vegetation.	No recent records of red-legged frogs have been reported on the valley floor, and red-legged frogs are considered to have been extirpated from this area. The presence of predatory fish, bullfrogs, mitten crabs, and crayfish further reduces the habitat suitability for this species on the site. Additionally, much of the aquatic habitat within the project site is comprised of saltwater environments. Presumed absent.
Aleutian Canada Goose (*Branta canadensis leucopareia*)	FT	Freshwater marshes, flooded fields.	Rare winter visitor, few records from vicinity.
California Black Rail (*Laterallus jamaicensis coturniculus*)	ST, SP	Breeds in a variety of wetland types; in San Francisco Bay area, pickleweed marshes.	Marginal habitat on site; possibly occurs as a rare transient, if at all, but no recent records from the vicinity of the site.
Western Snowy Plover (*Charadrius alexandrinus nivosus*)	FT, CSSC	Nests on sandy beaches on marine and estuarine shores.	Winters at salt ponds A5, A6, A7 and A8. Breeds on ponds A6 and A8 (dry portion).

Table 1. Special-status plant and animal species, their status, and potential occurrence on the Baylands Portion of the Lower Guadalupe River Project Site, Alviso, San Jose and Sunnyvale, California.

NAME	*STATUS	HABITAT	POTENTIAL FOR OCCURRENCE ON SITE
Bank Swallow (*Riparia riparia*)	ST	Colonial nester on vertical banks or cliffs with fine-textured soils near water.	Observed on site as rare transient. No suitable breeding habitat on site.
Federal or State Proposed Endangered or Threatened Species			
Fall-run Chinook Salmon – Central Valley ESU (*Oncorhynchus tshawytscha*)	FC	Cool rivers and large streams that reach the ocean and that have shallow, partly shaded pools, riffles, and runs.	Not known to spawn in the South San Francisco Bay historically, but small numbers of fall-run Chinook are present in the Guadalupe River. It is not known if this population has fully naturalized here. Although spawning and rearing habitat is not likely present in the Baylands portion of the project site, this species moves through the site to more suitable spawning areas upstream.
California Tiger Salamander (*Ambystoma californiense*)	FC, CSSC	Vernal or temporary pools in annual grasslands, or open stages of woodlands.	No suitable habitat on site; presumed absent.
California Species of Special Concern			
Western Pond Turtle (*Clemmys marmorata*)	CSSC	Permanent or nearly permanent water in a variety of habitats.	Uncommon along the lower reaches of the Guadalupe River. Not known from the Baylands portion of the Guadalupe River.
Common Loon (*Gavia immer*)	CSSC	Forage on fish in the bay and local ponds.	Occasional winter visitor; does not breed in area.
American White Pelican (*Pelecanus erythrorhnchos*)	CSSC	Forages on fish found in freshwater lakes and rivers, nests on islands in lakes.	Common species, forages on site. Regular visitor from late summer to spring. Not known to breed on site.
Double-crested Cormorant (*Phalachorcorax auritus*)	CSSC	Colonial nester on coastal cliffs, offshore islands, electrical transmission towers, and along interior lake margins. Feeds on fish.	Common species, forages on site; Nests on levees of salt ponds A9 and A10 and towers in Pond A18.
White-faced Ibis (*Plegadis chihi*)	CSSC	Forages in freshwater marshes, and to a lesser extent, brackish areas.	Occasional visitor in fall and winter. Has bred in heron rookery on Artesian Slough.
Northern Harrier (*Circus cyaneus*)	CSSC	Forages in marshes, grasslands, and ruderal habitats; nests in extensive marshes and wet fields.	Common species, forages on site; marginal nesting habitat on site.
Sharp-shinned Hawk (*Accipiter striatus*)	CSSC	Nests in woodlands, forages in many habitats in winter and migration.	Observed on site as a migrant and winter resident. No breeding records from the vicinity of the site.
Cooper's Hawk (*Accipiter cooperii*)	CSSC	Nests in woodlands, forages in many habitats in winter and migration.	Observed on site primarily as a migrant and winter resident. Potentially suitable nesting habitat exists on site.
Ferruginous Hawk (*Buteo regalis*)	CSSC	Forages in grasslands and occasionally in other open habitats during migration and winter.	Rare forager during migration and winter. Does not nest in the region.
Osprey (*Pandion haliaetus*)	CSSC	Nests in tall trees or cliffs on freshwater lakes and rivers and along seacoast; feeds on fish.	Occasional forager on site. No breeding records from the vicinity of the site.
Golden Eagle (*Aquila chrysaetos*)	CSSC	Breeds on cliffs or in large trees or electrical towers, forages in open areas.	Occasional forager, primarily during the nonbreeding season. No nesting habitat on site.
Merlin (*Falco columbarius*)	CSSC	Uses many habitats in winter and migration.	Regular in low numbers during migration and winter. Does not nest in California.
Prairie Falcon (*Falco mexicanus*)	CSSC	Nests on cliffs, forages in open areas.	Occasional forager, primarily during the nonbreeding season. No nesting habitat on site.

Table 1. Special-status plant and animal species, their status, and potential occurrence on the Baylands Portion of the Lower Guadalupe River Project Site, Alviso, San Jose and Sunnyvale, California.

NAME	*STATUS	HABITAT	POTENTIAL FOR OCCURRENCE ON SITE
Long-billed Curlew (*Numenius americanus*)	CSSC	Nests on prairies and short-grass fields; forages on mud flats, marshes, pastures, and agricultural fields.	Occurs in moderate numbers as a migrant and winter resident.
California Gull (*Larus californicus*)	CSSC	Nests on lakes inland and, around S. F. Bay, in salt ponds.	Common resident. Breeds on salt ponds A6, A9, A10. Second largest colony in California.
Black Tern (*Chlidonias niger*)	CSSC	Nests in freshwater marshes, forages over marshes, ponds, lakes, and moist meadows.	Rare transient. Does not breed on site.
Black Skimmer (*Rynchops niger)*	CSSC	Nests on abandoned levees and islands in salt ponds and marshes.	A few occur on these ponds during the breeding season; has bred at nearby salt ponds, could potentially breed at the site during the project.
Short-eared Owl (*Asio flammeus*)	CSSC	Nests on ground in tall emergent vegetation or grasses, forages over a variety of open habitats.	Uncommon resident species. Little is known about its local distribution. Breeds in other southern San Francisco Bay locations. Marginal breeding habitat exists on site. Most numerous in area in migration and winter.
Burrowing Owl *(Athene cunicularia)*	CSSC	Flat grasslands and ruderal habitats.	Resident in low numbers; breeds in several areas on the site.
Vaux's Swift (*Chaetura vauxi*)	CSSC	Nests in snags in coastal coniferous forests or, occasionally, in chimneys; forages aerially.	Forages over site during spring. No nesting habitat on site.
Loggerhead Shrike (*Lanius ludovicianus*)	CSSC	Nests in tall shrubs and dense trees, forages in grasslands, marshes, and ruderal habitats.	Common resident; breeds in several areas on the site.
California Horned Lark (*Eremophila alpestris actia*)	CSSC	Short-grass prairie, annual grasslands, coastal plains, open fields.	Uncommon at the site, primarily during nonbreeding season. Marginally suitable nesting habitat present on site.
California Yellow Warbler (*Dendroica petechia brewsteri*)	CSSC	Breeds in riparian woodlands, particularly those dominated by willows and cottonwoods.	This species has been observed on site as a migrant, although subspecific status has not been determined.
Saltmarsh Common Yellowthroat (*Geothlypis trichas sinuosa*)	CSSC	Breeds primarily in fresh and brackish marshes in tall grass, tules, willows; uses salt marshes more in winter.	Common resident. Breeds in bulrush/cattail in all slough channels on site.
Alameda Song Sparrow (*Melospiza melodia pusillula*)	CSSC	Breeds in salt marsh, primarily in marsh gumplant and cordgrass along channels.	This subspecies occurs on outer sections of the Alviso and Guadalupe sloughs.
Tricolored Blackbird (*Agelaius tricolor)*	CSSC	Breeds near freshwater in dense emergent vegetation.	Observed on site primarily as a forager during winter; potential breeder within the project site.
Pallid Bat (*Antrozous pallidus*)	CSSC	Forages over many habitats; roosts in buildings, rocky outcrops and rocky crevices in mines and caves.	Likely forager on open grassland; potential roosting habitat in attics of old buildings.
Salt Marsh Wandering Shrew (*Sorex vagrans halicoetes*)	CSSC	Medium high marsh 6-8 feet above sea level with abundant driftwood and pickleweed.	Suitable habitat on site; found in moist non-tidal marshes and tidal marshes. Known to be present.
State Protected Species or CNPS Species			
Congdon's Tarplant (*Centromadia parryi* ssp. *congdonii*)	CNPS 1B	Valley and foothill grassland habitat in areas with alkaline soils and in sumps and disturbed areas where water collects.	Potential habitat for this species exists along the levees, within ditches, and mesic ruderal uplands.
Point Reyes Bird's Beak (*Cordylanthus maritimus* ssp. *palustris*)	CNPS 1	Coastal salt marshes.	Suitable habitat present on site, but presumed extirpated in Santa Clara and San Mateo counties. No surveys needed.

Table 1. Special-status plant and animal species, their status, and potential occurrence on the Baylands Portion of the Lower Guadalupe River Project Site, Alviso, San Jose and Sunnyvale, California.

NAME	*STATUS	HABITAT	POTENTIAL FOR OCCURRENCE ON SITE
Delta Tule Pea (*Lathyrus jepsonii* var. *jepsonii*)	CNPS 1B	Brackish and freshwater marshes below 30 meters elevation.	Suitable habitat present on site, but presumed absent since there are no records of local populations of this species in the project vicinity. No surveys needed.
Hairless Popcorn Flower	CNPS 1A	Alkaline meadows and coastal salt marshes.	Suitable habitat present on site, but presumed absent due to reports of extinction within California. No surveys needed.
White-tailed Kite (*Elanus caeruleus*)	SP	Nests in tall shrubs and trees, forages in grasslands, marshes, and ruderal habitats.	Common resident; breeds on the site.

FE = Federally-listed Endangered
FT = Federally-listed Threatened
FC = Federal Candidate. Sufficient biological information to support a proposal to list the species as Endangered or Threatened
FPD = Federally Proposed for Delisting
SE = State-listed Endangered
ST = State-listed Threatened
CSSC = California Species of Special Concern
SP = State Protected Species
CNPS 1A = Plants presumed extinct in California by California Native Plant Society (CNPS)
CNPS 1B = Plants considered by CNPS to be rare, threatened, or endangered in California, and elsewhere

Study Area offer suitable habitat for this species, this species is presumed absent according to the reports of its extinction in California.

Point Reyes Bird's Beak (*Cordylanthus maritimus* ssp. *palustris*). Federal Listing Status: None; State Listing Status: None; CNPS List 1B. This annual hemiparasitic herb occurs in coastal salt marsh. The blooming period extends from June to October. The range of this species currently includes Humboldt, Marin, and Sonoma counties. It is believed extirpated from Alameda, Santa Clara, and San Mateo counties. The CDFG Rarefind Database has five historic records for this species in Santa Clara and San Mateo counties within the quadrangle search area. However, all of these historic occurrences are now believed to be extirpated, including one near Alviso. While salt and brackish marshes and other wetlands within the Reconnaissance Study Area offer suitable habitat for this species, this species is presumed absent according to the reports of its extirpation in the Santa Clara and San Mateo counties.

SPECIAL-STATUS WILDLIFE SPECIES

A number of special-status animals occur in the project area (Table 1). Most of these species occur on the site infrequently, for example during passage or forage, and are discussed below. The species that use the site regularly are discussed thereafter. The statuses of all special-status wildlife species that occur on the site are presented in Table 1.

Several species listed as Federally Endangered (FE) or Federally Threatened (FT) occur as seasonal residents, or forage on the site: the California Least Tern, *Sterna antillarum brownii* (FE), California Brown Pelican, *Pelicanus occidentalis californicus* (FE), the Peregrine Falcon, *Falco peregrinus* (SE), and the Bald Eagle, *Haliaeetus leucocephalus* (FT, SE). The primary postbreeding (fall) staging area of the Least Tern in the South Bay is in the complex of ponds immediately north of Moffett Field and, to a lesser extent, in the vicinity of Shoreline Park in Mountain View. Least Terns might forage in ponds A5 and A7 more regularly than in other ponds in the study area. The California Brown Pelican is a regular nonbreeding forager in the salt ponds including A5, A7, and A9–6 (less frequently in A14–16), often roosting on levees in the interior of the pond complex.

The Aleutian Canada Goose, *Branta canadensis leucopareia* (FT), is a rare winter visitor in the region. The Bank Swallow, *Riparia riparia* (ST), is a rare migrant through the region and has been observed on the project site. Species such as the California Black Rail (State Threatened and Federal candidate) and Bank Swallow (State Threatened) may occur rarely, but do not nest in the area. Migrant Willow Flycatchers (*Empidonax traillii*) occur rarely in scrubby vegetation on site, but these birds are strictly transients and very likely represent non-listed races rather than the listed *extimus* (FE) or *brewsteri* (SE).

Two species of amphibians of concern occur in Santa Clara County, but not on the project site: the California red-legged frog, *Rana aurora draytonii* (FT), and the California tiger salamander, *Ambystoma californiense* (a federal candidate for listing under the Endangered Species Act.) The steelhead rainbow trout, *Oncorhynchus mykiss* (FT), and Chinook salmon, *Oncorhynchus tshawytscha* (FT), migrate up the Guadalupe River to head-water spawning to the south (J. Smith and D. Salsbery, pers. comm.). The lower Guadalupe River (Alviso Slough) also could be used by adult steelhead and foraging smolts of both species when they swim down the river to the San Francisco Bay. These two species are discussed in more detail below.

A number of California Species of Special Concern occur on the project site. Many of these species occur infrequently to very infrequently, or use the site on a more or less casual basis. These species include: Western Pond Turtle (*Clemmys marmorata*) Common loon (*Gavia immer*), American Bittern (*Botaurus lentiginosus*), White-faced Ibis (*Plegadis chihi*), Osprey (*Pandion haliaetus*), Ferruginous Hawk (*Buteo regalis*), Golden Eagle (*Aquila chrysaetos*), Prairie Falcon (*F. columbarius*), Black Tern (*Childonias niger*), Rufous Hummingbird (*Selasphorus rufus*) Chipping Sparrow (*Spizella passerina*), and Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*). The Lawrence's Goldfinch (*Carduelis lawrencei*) is an erratic and rare visitor to the region.

The Short-eared Owl (*Asio flammeus*) occurs in South Bay wetlands somewhat irregularly, primarily in migration and winter, but could potentially breed in tall grassy or emergent vegetation on site. The California Horned Lark *(Eremophila alpestris actia)* and Yellow Warbler *(Dendroica petechia)* occur in habitats on site primarily as migrants (although it is unlikely that any warblers on site have been confirmed to represent the subspecies of special concern, the California Yellow Warbler, *D.p. brewesteri*). Finally, the Canvasback (*Aythya vakusunerua*) is a regular winter visitor to the project site but is not known to breed there.

The site provides foraging habitat for a group of special-status species that breed near, but not on, the site but that utilize foraging habitat on the site on a regular basis. Several of these species are listed as Species of Special Concern primarily out of concern for nesting areas. They are: Double-crested Cormorant, Great Blue Heron (*Ardea herodias*), Great Egret (*A. alba*), Snowy Egret (*Egretta thula*), and Black-crowned Night Heron (*Nycticorax nycticorax*). The Cooper's Hawk (*Accipter cooperii*) breeds in riparian and suburban trees in the area, but not on the project site. This species forages over the site, primarily during migration and winter, the only period that its smaller relative, the Sharp-shinned Hawk (*A. striatus*), occurs in the area. Another Species of Special Concern, the Vaux's Swift (*Chaetura vauxi*), forages over the site strictly as a transient, but it can be relatively numerous in spring and fall.

The following expanded descriptions pertain to special-status species known to occur regularly on site, present potential for being significantly impacted by the project, or occur in the area and are of heightened concern to the resource agencies.

FEDERAL SPECIAL-STATUS SPECIES

Three species listed as Federally Endangered (FE) or Federally Threatened (FT) breed in the Lower Guadalupe study area: the California Clapper Rail, *Rallus longirostris obsoletus,* (FE), Western Snowy Plover, *Charadrius alexandrinus nivosus*, (FT), and salt marsh harvest mouse, *Reithrodontomys raviventris* (FE). Two others, the steelhead rainbow trout, *Oncorhynchus mykiss* (FT), and Chinook salmon, *Oncorhynchus tshawytscha* (Federal Candidate), migrate through the area.

Chinook Salmon (*Oncorhynchus tshawytscha*), Central Valley Fall Run. Federal Listing Status: Candidate; State Listing Status: Species of Special Concern. Like the steelhead rainbow trout, the Central Valley fall-run Chinook salmon is an anadromous species. Adults migrate from the ocean to spawning streams from late August through October and begin spawning in beds of coarse river gravels between October and December. Adults die after spawning. After the eggs hatch, some juvenile salmon migrate downstream to the bay or ocean within a few months, while others may remain in freshwater rearing areas for up to a year in some systems. Younger fish remain in the ocean for several years before returning to freshwater streams and rivers to spawn. Like steelhead rainbow trout, Chinook salmon generally spawn in cool waters providing incubation temperatures no warmer than 55° F. Compared to steelhead, Chinook salmon are more likely to spawn in coarse gravels.

Fall-run Chinook salmon populations have suffered the effects of over-fishing by commercial fisheries, degradation of spawning habitat, added barriers to upstream migration, and reductions in winter flows due to damming. Approximately 40 to 50 percent of the spawning and rearing habitats in Central Valley streams have been lost or degraded. Hatchery-raised fish considerably enhance present populations. Because long-term population trends were generally stable, the National Marine Fisheries Service (NMFS) determined that the Central Valley fall- and late fall-run evolutionarily significant unit (ESU) was not a priority for listing as threatened or endangered. Rather, this ESU was determined to be a candidate for federal listing in September 1999.

Chinook salmon have not historically spawned in streams flowing into South San Francisco Bay. Since the mid-1980s, however, small numbers of fall-run Chinook salmon have been found in several such streams, including Coyote Creek, Los Gatos Creek, and the Guadalupe River (Smith 1998). These fish are probably strays from Central Valley runs. Genetic evidence suggests that at least some of these fish originated from hatchery stock released into Central Valley streams that have native Chinook salmon runs (Jerry Smith, David Salsbery, pers. comm.). These hatchery fish tend to stray because of hybridization between various ESUs within the hatcheries, and because some hatchery-raised fish are released away from spawning areas. Although most information produced by the NMFS concerning Chinook salmon does not address the salmon present in South San Francisco Bay streams, NMFS considers these salmon to be part of the Central Valley fall- and late fall-run ESU (Laura Hamilton, pers. comm.).

These fall-run Chinook salmon typically arrive in South San Francisco Bay streams in October or later, although on rare occasions, adult Chinook salmon have been detected in these streams in summer, and spawning has been observed on Los Gatos Creek in early September (David Salsbery, pers. comm.). Seasonal stream flow and temperature conditions in these streams may not be suitable for successful spawning by Sacramento River winter-run Chinook salmon, which typically spawn in late spring and summer, or by Central Valley spring-run Chinook salmon, which typically spawn in late summer and early fall. Therefore, any adult Chinooks found in the South San Francisco Bay in summer are either early fall-run fish or strays from a Central Valley run that are not expected to spawn successfully in these streams.

Some fall-run Chinook salmon caught by SCVWD personnel are tagged hatchery fish from the Central Valley. Since not all hatchery fish are tagged and smolts are not tagged before they leave the Coyote Creek watershed, it is unknown if untagged adults spawning in Coyote Creek represent smolts that originated in Coyote Creek or hatchery fish.

Steelhead Rainbow Trout (*Oncorhynchus mykiss*), Central California Coast ESU. Federal Listing Status: Threatened; State Listing Status: None. The steelhead rainbow trout is an anadromous form of rainbow trout that migrates upstream from the ocean and bay to spawn. Steelhead usually migrate upstream to spawning areas in late fall or early winter, when flows are sufficient to allow them to reach suitable habitat in far upstream areas that may have little water at other times of the year. Spawning occurs between December and June. Steelhead eggs remain in gravel depressions that are known as redds for one and one-half to four months before hatching. After hatching, young steelhead using the deeper reaches of streams as rearing areas will remain in freshwater streams for a year or two (range 1 to 4) before migrating to the ocean. After migration, these fish typically grow rapidly for two to three years before returning to freshwater streams to spawn. Unlike salmon, steelhead trout do not necessarily die after spawning. Many adults survive and return to the ocean after spawning, only to come back and spawn another season or two.

Steelhead rainbow trout usually spawn in clear, cool, perennial sections of relatively undisturbed streams. Preferred streams typically support dense canopy cover that provides shade, woody debris, and organic matter. These streams in which spawning occurs are usually free of rooted or aquatic vegetation. Gravel substrates are the optimum spawning habitat for these trout. Developing steelhead embryos cannot survive long in water temperatures above 58° F. Juveniles and adults are more tolerant of warm water temperatures but temperatures above 70° F are sub-optimal. Temperatures of 75° to 80° F are likely to be lethal, but anything above 70° F is stressful. Despite their general requirement for cool water, steelhead can use warmer habitats if food is available, such as fast water riffles where fish can feed on drifting insects (Smith and Li 1983). Consequently, central coast steelheads are often found in the shaded pools of small, cool, low-flow upstream habitats, and the riffles of warm water habitats below dams where summer releases provide high summer flows and fast water feeding habitat (Smith 1998).

Steelhead rainbow trout populations have declined due to over-harvesting by the recreational fisheries, degradation of spawning habitat, introduction of barriers to upstream migration, and reduction in winter flows due to damming and spring flows due to water diversion. On August 18, 1997, NMFS published a final rule to list the Central California Coast ESU of the steelhead rainbow trout as threatened under the FESA. This ESU includes all steelhead spawning from the Russian River in Sonoma County south to Aptos Creek in Santa Cruz County, including all steelhead spawning in streams flowing into San Francisco Bay streams. On February 16, 2000, NMFS proposed critical habitat for this and other ESUs as accessible reaches of all rivers within the range of each listed ESU.

Steelhead rainbow trout are known to occur in streams in the South San Francisco Bay area and they could potentially spawn in virtually any reach of a stream offering suitable spawning habitat and lacking downstream barriers to dispersal. Information on the fine-scale distribution of steelhead rainbow trout in South San Francisco Bay streams is limited. The Santa Clara Valley Water District (SCVWD) has collected data on steelhead distribution, but the data are not currently available to the public. Steelhead rainbow trout are uncommon in the Coyote Creek system. They are primarily restricted to Upper Penitencia Creek, especially within Alum Rock Park (Smith 1998). Anderson and Coyote reservoirs block access to the upstream sections of Coyote Creek, while SCVWD diversions likely restrict or block smolt from migrating downstream in most years (Smith 1998).

Suitable spawning habitat is not likely on the project site, but this species moves through the site to spawn upstream. The lower Guadalupe River (Alviso Slough) could be used by adult steelhead and foraging smolts when they swim down the river to the San Francisco Bay.

California Clapper Rail (*Rallus longirostris obsoletus*). Federal Listing Status: Endangered; State Listing Status: Endangered. The California Clapper Rail breeds in salt and brackish marshes along the edge of San Francisco Bay, and is most abundant in extensive salt marshes dominated by cordgrass, pickleweed, and marsh gumplant (*Grindelia stricta*) associated with numerous secondary tidal channels (Harvey 1980). Within these salt marshes, nests are placed in or under these vegetation as well as saltgrass, or tidal wrack (DeGroot 1927, Evens and Page 1983, Harvey 1980, Foerster et al. 1990). Most foraging occurs on exposed mud along tidal channels (usually secondary channels) or in vegetation at the edges of such channels (Shuford 1993). In winter, California Clapper Rails tend to forage primarily in cordgrass-dominated habitat in the lower Guadalupe marsh (P. R. Kelly, pers. comm. in Shuford 1993), although tall vegetation at the edges of the upper marsh provides important cover during high winter tides.

Although California Clapper Rails also breed in brackish marshes, especially those dominated by alkali bulrush, the importance of these marshes to California Clapper Rails is not well understood (H. T. Harvey & Associates 1989, 1990b, 1991a,b, Collins et al. 1994). Breeding-season surveys of South San Francisco Bay marshes by Gill (1979) found California Clapper Rails in salt marshes west of Drawbridge (just north of Coyote Slough) but found none in more brackish marshes to the east, although California Clapper Rails had been recorded in these marshes during winter. Likewise, intensive surveys during the 1989 breeding season detected no California Clapper Rails in brackish marshes east of Drawbridge, and found California Clapper Rails west of Drawbridge to be associated more strongly with cordgrass-dominated habitats than with alkali bulrush (H. T. Harvey & Associates 1989). However, the 1989 surveys documented breeding California Clapper Rails in a wide variety of plant associations, and surveys of the same areas in winter 1989-1990 and during the breeding season of 1990 found a number of California Clapper Rails occupying several brackish, alkali bulrush-dominated marshes well east of Drawbridge (H. T. Harvey & Associates 1990a,b). In addition, California Clapper Rails were found in nearly pure stands of alkali bulrush along Guadalupe Slough in 1990 and 1991 (H. T. Harvey & Associates 1991a,b). Although it has been suggested that habitat quality may be lower in brackish marshes than in salt marshes (Shuford 1993), further studies comparing reproductive success in different marsh types are necessary to determine the value of brackish marshes to California Clapper Rails.

Few surveys for California Clapper Rails have been conducted in the Lower Guadalupe study area, as most surveys for this species in the South San Francisco Bay area have focused on more expansive marshes (e.g., Harvey 1980, Moss 1980, Foerster et al. 1990). Nevertheless, several surveys documented California Clapper Rails along the southern margin of Coyote Creek (the northern border of the Lower Guadalupe study area) and along Alviso and Guadalupe Sloughs. In the early 1970s, Gill (1979) recorded California Clapper Rails "along the larger fringing marshes of Guadalupe and Alviso sloughs." During 1989, breeding-season surveys in a 26-acre section of transitional salt/brackish marsh along Alviso Slough, approximately 3.5 km upstream from the mouth of the slough, recorded five California Clapper Rails. These included one pair using a narrow strip of cordgrass along the main slough, another pair using a mixture of cordgrass and alkali bulrush, and a single individual in a pure stand of Alkali Bulrush (H. T. Harvey & Associates 1989). Two pairs were found occupying the same marsh in spring 1990 (H. T. Harvey & Associates 1990b). Breeding season surveys in 1990 also recorded a pair along the Guadalupe Slough adjacent to southern boundary of Pond A5 (H. T. Harvey & Associates 1991a), as well as several pairs in the salt marsh habitat along the southern margin of Coyote Slough (H. T. Harvey & Associates 1990b). Particularly favorable locations in this tract were at Triangle and Goose Point.

Winter surveys (H.T. Harvey & Associates 1990a) found no California Clapper Rails in the bulrush-dominated habitat along upper Alviso Slough but detected two individuals in mixed cordgrass/pickleweed salt marsh approximately 2.5 km downstream from the Alviso Marina. Annual winter California Clapper Rail surveys conducted by the San Francisco Bay National Wildlife Refuge do not typically cover most of Alviso Slough, although these surveys did detect one individual approximately 2.8 km downstream from the Alviso Marina on 10 December 1993 and three individuals at the mouth of the slough on 1 January 1995 (J. Albertson, pers. comm.). Winter surveys by SCVWD in 2000 did not detect Clapper Rails along Guadalupe Slough at the north end of Pond A4. Extensive surveys for the Virginia Rail and Sora at Sunnyvale East and Guadalupe Slough upstream of Sunnyvale East by SFBBO biologists in 1998 did not detect Clapper Rails.

California Clapper Rails have occasionally been recorded along the upper reaches of Alviso Slough between the Gold Street Bridge and the vicinity of the Alviso Marina. Both plant communities and salinity in these areas are typical of freshwater (rather than brackish) systems. In the late 1980s, a single male was seen and heard calling within the Alviso Marina by H. T. Harvey & Associates' biologists, although repeated surveys failed to detect any California Clapper Rails in the area on subsequent dates. Another calling individual was heard in the Alviso Marina by an H. T. Harvey & Associates' biologist on 2 May 1997, although again, repeated surveys failed to relocate the bird on subsequent dates. In June 1997, an H. T. Harvey & Associates' biologist heard two individuals calling (and one seen) from the vegetation along the south side of the slough adjacent to the marina. From 1989 to 1998, summer and fall botulism surveys conducted annually along Alviso Slough in the vicinity of the marina by the SFBBO produced only one Clapper Rail record (1 October 1997) during a total of 166 surveys (SFBBO, unpublished reports). A single individual heard in spring 1997 by an H. T. Harvey & Associates' ornithologist just below the Gold Street Bridge represents the uppermost record along the slough.

Habitat along much of Alviso and Guadalupe Sloughs is of moderate to low quality for breeding California Clapper Rails. Diking of wetlands for the creation of salt evaporation ponds adjacent to Alviso Slough reduced the banks of the slough to narrow linear strips. As a result, stands of cordgrass and bulrush are too narrow in many areas to provide suitable nesting habitat. Also, few secondary channels used by foraging rails are present along the main slough. Surveys at other locations in the South San Francisco Bay area having plant associations similar to those along Alviso Slough have found California Clapper Rails to be more numerous in broad expanses of marsh with numerous secondary channels than in narrow strips of marsh such as those found along Alviso Slough (H. T. Harvey & Associates 1989, 1990b). Habitat quality is further limited in the uppermost reaches (e.g., from Gold Street bridge downstream to, and including, the Alviso Marina) by the freshwater nature of the slough and marsh vegetation. Nevertheless, some of the broader expanses of tidal marsh having secondary channels along the middle and lower reaches of Alviso Slough, including some areas dominated by alkali bulrush, provide potentially suitable nesting and foraging habitat for at least a few pairs of these rails.

To avoid disturbances to the California Clapper Rail during its breeding season, the U.S. Fish and Wildlife Service is known to restrict activities in nearby areas from February 1 to August 31.

Western Snowy Plover (*Charadrius alexandrinus nivosus*). Federal Listing Status: Threatened; State Listing Status: Species of Special Concern. The Western Snowy Plover historically nested primarily on sandy coastal beaches and on the margins of alkali lakes and playas in inland areas. It is not known whether this species nested inside San Francisco Bay before conversion of salt marsh to salt evaporation ponds. However, these ponds have provided suitable nesting and foraging habitat since the beginning of the 20th century (Grinnell et al. 1918), and currently about 10% of the California population of Snowy Plovers breeds within San Francisco Bay salt ponds, mostly in the southern part of the Bay (Page and Stenzel 1981, Page et al. 1991). Here this species nests on flat, bare or sparsely vegetated substrates, particularly light-colored substrates such as salt flats (Feeney and Maffei 1991). Nests may be placed on salt pond levees, islands, or dry salt flats (Cogswell 1977). Adults nesting in these ponds, and their chicks, forage almost entirely within the salt ponds or on surrounding levees.

Snowy Plovers were recorded nesting on salt pond levees in Alviso as early as 1947 (*Bulletin of the Santa Clara Valley Audubon Society*, August 1947, pp. 1–2). By this time, the Snowy Plover was likely well established as a breeder in the Alviso area. Breeding was confirmed here nearly every year during the 1950s (*Audubon Field Notes* 5:273, 10:359, 11:374, 13:451, Sibley 1952), with a high of 14 nests found in 1955 (*Avocet* 2(5): 25–26). In 1971, Gill (1972) found nesting Snowy Plovers on the Knapp Gun Club property (at the northern end of ponds A5 and A6) near the mouth of Alviso Slough. Page and Stenzel (1979) recorded Snowy Plovers in each of the three salt evaporation ponds bordering the south side of Alviso Slough (ponds A6, A7, and A8, numbered downstream-to-upstream). They found a nest in Pond A6, a brood on a levee bordering Pond A7, and a single individual in Pond A8.

The most recent information on Snowy Plover distribution along Alviso Slough has been compiled from incidental observations made by SFBBO during surveys of colonial waterbirds using the salt evaporation ponds along the slough (Ryan and Parkin 1998). Snowy Plovers have recently been recorded and confirmed nesting in two of the three salt evaporation ponds bordering the southern side of Alviso Slough (ponds A6 and A8). In Pond A6, at the lower end of Alviso Slough, SFBBO detected Snowy Plovers every year in which surveys were conducted between 1986 and 1994, averaging 4.0 (range 1–18) adults/survey. Breeding was confirmed here in five of these nine years, with a peak count of two nests on 14 May 1994. Although SFBBO has not recorded Snowy Plovers in Pond A7, numerous sightings and confirmed nesting has been documented in Pond A8, located south and west of the uppermost reaches of Alviso Slough. Here, between 1981 and 1997, Snowy Plovers were recorded in 11 of the 13 years in which SFBBO conducted surveys, with an average of 9.4 (range 0–20) adults/survey. Breeding was confirmed during nine years, with a high of 19 active nests on 3 July 1996. The vast majority of Snowy Plover activity in Pond A8 was at the southern end of the pond, which is mostly dry during the breeding season in most years. Because these survey data were collected only from levees, occasionally without the use of a spotting scope, and without standardized survey protocols, these data represent a minimum estimate of the actual number of plovers using these ponds.

Incidental observations on Pond A8 made by birders, most viewing from the observation platform south of San Tomas Aquino Creek, and other observers complement SFBBO's data well. On 4 June 1989, a year in which SFBBO did not conduct breeding-season surveys at these ponds, a brood of Snowy Plover chicks was seen at the west end of Pond A8 (M. Mammoser, pers. comm.). On 4 June 1993, a year in which SFBBO conducted no surveys of these ponds, at least nine Snowy Plovers were seen in the south-central portion of Pond A8 (S. Rottenborn, pers. obs.). Although breeding was not confirmed in 1997, birders observed 1–2 adult Snowy Plovers in Pond A8 on four dates between 8 April and 13 August of that year. On 13 May 1998, 19 adults and three active nests were observed at the south end of Pond A8, and in 1999, protocol-level Snowy Plover surveys detected up to 10 adults and one nest (H. T. Harvey & Associates 1999). Also in 1999, SCVWD biologists observed one pair nesting in Pond A8D; two pair were detected here in 2000 (Ryan 2000). Greater numbers of individuals were observed foraging at Pond A8W than at Pond A8D during the winter months.

Snowy Plovers have occasionally been recorded foraging in the diked ponds on the north/east side of Alviso Slough (ponds A9–A12) by birders. However, ponds A10, A11, and A12 usually contain water year-round, and water in Pond A9 generally does not begin to recede until late summer. As a result, Snowy Plovers likely do not nest in or around these ponds, or do so only sporadically and in small numbers. Past surveys of Snowy Plovers in the South San Francisco Bay area (Gill 1972, Page and Stenzel 1979) failed to find nesting plovers in these ponds. The only recent nesting records in the vicinity of these ponds consist of 1–2 pairs that nested in some years in a small impoundment between Pond A12 and the railroad tracks, north of the Alviso Marina and well removed from Alviso Slough (M. Rogers, M. Mammoser, pers. comm.).

Salt Marsh Harvest Mouse (*Reithrodontomys raviventris*). Federal Listing Status: Endangered; State Listing Status: Endangered. The salt marsh harvest mouse inhabits pickleweed marshes of the San Francisco Bay. This species is most abundant in deep, dense pickleweed in marshes providing non-submerged refugia during high winter tides (Shellhammer et al. 1982). Although this species makes some use of grasses and salt-tolerant forbs at the upper margins of salt and brackish marshes, it is closely tied to the cover of dense pickleweed, and it makes little use of pure bulrush or cordgrass stands (Wondolleck et al. 1976, Shellhammer 1977). These mice inhabit both marshes that are open to tidal action and diked marshes, provided that suitable pickleweed habitat is present.

Numerous trapping studies have documented the presence of salt marsh harvest mice in pickleweed-dominated marshes in the Alviso area, such as New Chicago Marsh and in areas along the southern margin of Coyote Creek that support pickleweed growth (c.f., Rice 1974, Zetterquist 1976, Muench 1985, Shellhammer et al. 1982, Shellhammer et al. 1985, H. T. Harvey & Associates 1990c). In some of these locations, these mice have been captured sporadically (i.e., not during every trapping effort) and/or in low numbers. Nevertheless, this species has been captured fairly consistently in areas providing high-quality pickleweed habitat, and any such habitat in the Alviso area provides at least potentially suitable habitat.

No trapping surveys for salt marsh harvest mice have been conducted along Alviso and Guadalupe Sloughs. However, suitable habitat is present in pickleweed-dominated areas along the lower reaches of each slough, and this species is expected to be present in these areas. Pickleweed is more sparsely distributed along the middle and upper reaches of these sloughs, and where it is present it is often restricted to a narrow, often interrupted band at the toe of the levee slope. This habitat is less suitable for these mice. Dense and/or tall vegetation is present on the levee slopes along portions of the sloughs, providing refugia during high tides.

STATE SPECIAL-STATUS SPECIES

Northern Harrier (*Circus cyaneus*). Federal Listing Status: None; State Listing Status: Species of Special Concern. The Northern Harrier is commonly found in open grasslands, agricultural areas, and marshes. Nests are built on the ground in areas where long grasses or marsh plants provide cover and protection. Harriers hunt for a variety of prey, including rodents, birds, frogs, reptiles, and insects by flying low and slowly in a traversing manner utilizing both sight and sound to detect prey items. Northern Harriers are common in the Central Valley, especially during winter.

This species is a common forager over the project site, particularly during the non-reproductive season when migrant and wintering birds augment the local resident population. Northern Harriers bred locally in the South Bay and there is marginal potential breeding habitat on the site. Paired harriers have been observed during the breeding season in the vicinity of the New Chicago Marsh, the Alviso Environmental Education Center and Pond A8.

White-tailed Kite (*Elanus leucurus*). Federal Listing Status: None; State Listing Status: Fully Protected Species. This species prefers habitats with low ground cover and variable tree growth. Kite nests are built near the tops of oaks, willows, or other dense broad-leafed deciduous tress in partially cleared or cultivated fields, grassy foothills, marsh, riparian, woodland, and savannah. Kites prey primarily on small rodents (especially the California vole), but also feed on birds, insects, reptiles, and amphibians. Once considered Endangered, the White-tailed Kite is now fairly common.

This species occurs commonly throughout the year, primarily in the upland fringes of the project site. It does breed in the area, and potential and occupied breeding habitat includes coyote brush on dikes on the southeast edge of the project site, trees in the Alviso area and in the vicinity of the Environmental Education Center.

California Gull (*Larus californicus*). Federal Listing Status: None; State Listing Status: Species of Special Concern (nesting colony). Historically, the California Gull bred on saline inland lakes. In 1980, a small group colonized abandoned levees on Pond A6. This colony has grown to over 5,700 nesting pairs in 2000, and has expanded to over 8,100 pairs in San Francisco Bay. This colony is the only known coastal colony and the second largest colony in California (Shuford and Ryan 2000). It is the only colony within the project site. Adult California Gulls attend the colony year-round, but numbers increase during the spring months, egg laying occurs between mid-April and mid-May, and most young are fledged by mid-August (Shuford and Ryan 2000, T. Ryan, pers. comm.). Adults forage on natural prey, brine flies and their larvae, and brine shrimp. This is supplemented by food obtained from human sources including two large dumps that are located nearby.

Caspian Tern (*Sterna caspia*). Federal Listing Status: None; State Listing Status: Species of Special Concern (nesting colony). The Caspian Tern is the largest of the North American terns. This species forages over open bay, salt ponds, marshes, and a variety of freshwater habitats. Caspian Terns were first observed breeding in San Francisco Bay in 1922 near Coyote Hills. Prior to 1990, the majority nested in southern San Francisco Bay, with a peak of 2,350 individuals in 1981. In 1997, when the most current estimation was made, there were 1,400–1,500 pairs with only 136 of these in the South Bay. The only colony in Santa Clara County is on two small islands in Pond A7, where approximately 25 to 75 pairs have nested since 1997.

Forster's Tern (*Sterna forsteri*). Federal listing status: None; State listing status: Species of Special Concern (nesting colony). The Forster's Tern is a medium-sized tern that forages over salt ponds, marshes, slough channels, open bays and a variety of local freshwater habitats. This species was first observed breeding in the San Francisco Bay Estuary in 1948, when approximately 100 nests were discovered at the east end of the San Mateo Bridge. Prior to this date, Forster's Terns were considered a migrant or visitor during winter months and scattered breeding attempts on few occasions (Grinnell and Miller 1944). Their population appears to have peaked at 2,500 nests, or approximately 5,000 breeding adults in 1981. There were 1886 nests present in southern San Francisco Bay in 2000 (Ryan and Dakin in prep). Forster's Terns breed in salt ponds on abandoned levees, duck blinds and dredge-spoil islands. Within the project site approximately 50 to 250 pairs breed within ponds A5, A6, A7 and A8. The majority in recent years has bred at ponds A5 and A7, with few attending A6 and A8 sporadically (T. Ryan, pers. comm.). The second largest colony (340 pair in 2000) in the San Francisco Bay area is at Pond A16 on four large levees that were created in 1998 (Ryan and Dakin in prep).

Burrowing Owl (*Athene cunicularia*). Federal Listing Status: None; State Listing Status: Species of Special Concern. The Burrowing Owl is a small, terrestrial owl of open country. Burrowing Owls favor flat, open grassland or gentle slopes and sparse shrub land ecosystems. These owls prefer annual and perennial grasslands, typically with sparse, or nonexistent, tree or shrub canopies. In California, Burrowing Owls are found in close association with California ground squirrels. Owls use ground squirrel burrows for shelter and nesting. Ground squirrels provide nesting and refuge burrows, and maintain short vegetation height, which provides foraging habitat and visual protection from avian predators. In the absence of ground squirrel populations, habitats soon become unsuitable for occupancy by owls. Burrowing Owls are semi-colonial nesters, and group size is one of the most significant factors contributing to site constancy by breeding Burrowing Owls. The nesting season, as recognized by the California Department of Fish and Game, runs from February 1 through August 31.

The number of Burrowing Owls in the Santa Clara Valley (and the San Francisco Bay area in general) is decreasing rapidly and the species is of particular concern. Small numbers of Burrowing Owls have bred in ground squirrel burrows in levees on the project site.

Short-eared Owl (*Asio flammeus*). Federal listing status: None; State listing status; Species of Special Concern. Short-eared Owls occur in open habitats such as grasslands, wet meadows, and marshes. They require tules or other tall grasses for nesting or daytime refuge. This species once bred much more widely in California, including the San Francisco Bay area. However, the species now occurs primarily as a migrant and winter visitor and is primarily a local breeder within California. It is a rare and local breeder in the San Francisco Bay area. Marginal breeding habitat does occur on site and more optimal habitat occurs in nearby areas of the San Francisco Bay Wildlife Refuge, including marsh habitats in the vicinity of the Alviso Education Center. The species does occur in the project area in migration and winter.

Loggerhead Shrike (*Lanius ludovicianus*). Federal Listing Status: None; State Listing Status: Species of Special Concern. This predatory songbird inhabits much of lower 48 states of the United States of America. Loggerhead Shrikes prefer open habitats interspersed with shrubs, trees, poles, fences or other perches from which they can hunt. Some populations of the Loggerhead Shrike, primarily those in eastern North America, have declined significantly over the last 20 years. Other populations, including those in western North America, appear to be decreasing as well. Even with this trend, Loggerhead Shrikes are still considered a fairly common species in California and are found throughout the San Joaquin Valley.

Loggerhead Shrikes are still fairly common in and around the project area, where the species occurs throughout the year. This species breeds in tall shrubs and trees on the site.

California Horned Lark (*Eremophila alpestris actia*). Federal Listing Status: None; State Listing Status: Species of Special Concern. Horned Larks occur over nearly all of North America in bare ground habitats with short grass, scattered bushes, or no vegetation. In winter, they often form large flocks that sometimes contain several subspecies. Grinnell and Miller (1944) list 13 subspecies of Horned Lark in California. One of these subspecies, the California Horned Lark, is currently a Species of Special Concern in California. This subspecies is a widespread breeder along the coast and in the Central Valley of California, and is the only subspecies that nests in the area. Although coastal breeding populations are becoming relatively scarce, interior numbers, especially in the San Joaquin Valley and surrounding arid foothill habitats, remain high.

Horned Larks occur primarily as migrants and winter visitors in the project area, although sub-specific status of these birds remains largely unknown. This species is a local breeder in Santa Clara County. Limited potential (and probably marginal) breeding habitat occurs on the project site.

Saltmarsh Common Yellowthroat (*Geothlypis trichas sinuosa*). **Federal Listing Status: None; State Listing Status: Species of Special Concern.** The Saltmarsh Common Yellowthroat inhabits emergent vegetation and breeds in fresh and brackish marshes and associated upland areas in the San Francisco Bay area. This subspecies (one of approximately 12 subspecies of Common Yellowthroat recognized in North America) breeds from mid-March through early August and pairs frequently raise two clutches per year. Because this subspecies cannot be reliably distinguished in the field, determination of the presence of Saltmarsh Common Yellowthroat can be achieved only by locating a nest in the breeding range known for this subspecies, or by observing them during the summer months when only the Salt-marsh Common Yellowthroat is present. Although little is known regarding the movements of this taxon, the wintering areas have been described as coastal salt marshes from the San Francisco Bay region to San Diego County.

Saltmarsh Common Yellowthroats breed in fresh and brackish marshes. They breed in bulrush and cattail marshes in all the slough channels on the project site.

Alameda Song Sparrow (*Melospiza melodia pusillula*). **Federal Listing Status: None; State Listing Status: Species of Special Concern.** The Alameda Song Sparrow is one of three subspecies of Song Sparrow breeding only in salt marsh habitats in the San Francisco Bay area. Locally it is most abundant in the taller vegetation found along tidal sloughs, including salt marsh cordgrass and marsh gumplant. Although it is occasionally found in bulrushes in brackish marshes, the Alameda Song Sparrow is very sedentary and is not known to disperse upstream into freshwater habitats. Populations of the Alameda Song Sparrow have declined due to the loss of salt marshes around the Bay, although within suitable habitat it is still fairly common. The location of the interface between populations of the Alameda Song Sparrow and those of the race breeding in freshwater riparian habitats (*M. m. gouldii*) along most creeks is not known due to difficulties in distinguishing individuals of these two races in the field.

Optimum habitat for this subspecies comprises tidal salt marsh, although it occurs in tidal brackish marsh, seasonal wetlands, salt pond complexes and other adjacent habitats. Alameda Song Sparrows occur along the outer portions of Alviso and Guadalupe sloughs.

Tricolored Blackbird (*Agelaius tricolor*). **Federal listing status: None; State Listing Status: Species of Special Concern.** Tricolored Blackbirds are found almost exclusively in the Central Valley, and central and southern coastal areas of California. In 1992, surveys by the California Department of Fish and Game determined that the population of this species was much larger than previously believed. Thus, the concern for the species lessened considerably.

The Tricolored Blackbird is highly colonial in its nesting habits and forms dense breeding colonies of up to tens of thousands of pairs. This species typically nests primarily in tall, dense, stands of cattails or tules, but also nests in blackberry, wild rose bushes and tall herbs. Nesting colonies are typically located near standing or flowing freshwater. Tricolored Blackbirds form large, often multi-species, flocks during the non-breeding period and range more widely than during the reproductive season.

Tricolored Blackbirds have nested in the immediate vicinity of the project site and has roosted in emergent vegetation within the project boundaries. There is appropriate breeding habitat for this species within the project area.

Pallid Bat (*Antrozous pallidus*). Federal Listing Status: None; State Listing Status: Species of Special Concern. This medium-sized bat occurs throughout much of California. The pallid bat is usually found in open lowlands were it preys upon flightless insects. It prefers roosting in caves and mine tunnels but buildings and trees may also be used. Pallid bats are pale to light brown in color, and, at about 24 grams, the Pacific race is one of the state's largest bats. Coastal colonies commonly roost in deep crevices in rocky outcroppings, in buildings, under bridges, and in hollow trees. Colonies can range from a few individuals to over a hundred and are non-migratory. Some female/young colonies (typically the coastal subspecies) use their day roost for their nursery as well as hibernacula, while other colonies (typically those in the desert) migrate locally on a seasonal basis. Although crevices are important for day roosts, night roosts often include open buildings, porches, garages, highway bridges, and mines. Pallid bats may travel up to several miles for water or foraging sites if roosting sites are limited. This bat prefers foraging on terrestrial arthropods in dry open grasslands near water and rocky outcroppings or old structures. They may also occur in oak woodlands and at the edge of redwood forests along the coast. Pallid bats are sensitive to human disturbances at roost sites.

Pallid bats likely forage over the project site. Structures on site provide potential roosting habitat.

Salt Marsh Wandering Shrew (*Sorex vagrans halicoetes*). Federal Listing Status: None; State Listing Status: Species of Special Concern. Formerly more widely distributed in the Bay area, this subspecies is now confined to salt marshes of the South Bay. Salt marsh wandering shrews inhabit tidal salt marsh and are typically found in *Salicornia.*

Potential suitable habitat for the salt marsh wandering shrew exists on the project site, although documented records of this subspecies are few. They are known from New Chicago Marsh and formerly from Triangle Marsh, and are likely present in most of the dense tidal salt marshes of the area.

REGULATED HABITATS AND RESOURCES

WATERS OF THE UNITED STATES

Regulations Overview. Areas meeting the regulatory definition of "Waters of the U.S." (jurisdictional waters) are subject to the jurisdiction of the U.S. Army Corps of Engineers (USACE) under provisions of Section 404 of the Clean Water Act (1972) and Section 10 of the Rivers and Harbors Act (1899). These waters may include all waters used, or potentially used, for interstate commerce, including all waters subject to the ebb and flow of the tide, all interstate waters, all other waters (intrastate lakes, rivers, streams, mudflats, sand flats, playa lakes, natural ponds, etc.), all impoundments of waters otherwise defined as "Waters of the U.S.," tributaries of waters otherwise defined as "Waters of the U. S.," the territorial seas, and wetlands (termed Special Aquatic Sites) adjacent to "Waters of the U.S." (33 CFR, Part 328, Section 328.3). Wetlands on non-agricultural lands are identified using the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987).

Areas not considered to be jurisdictional waters include non-tidal drainage and irrigation ditches excavated on dry land, artificially-irrigated areas, artificial lakes or ponds used for irrigation or stock watering, small artificial water bodies such as swimming pools, and water-filled depressions (33 CFR, Part 328).

Construction activities within jurisdictional waters are regulated by the USACE. The placement of fill into such waters must be in compliance with permit requirements of the USACE. No USACE permit will be effective in the absence of state water quality certification pursuant to Section 401 of the Clean Water Act. The State Water Resources Control Board is the state agency (together with the Regional Water Quality Control Boards [RWQCB]) charged with implementing water quality certification in California.

Survey Results. The ground-truthing reconnaissance survey of the zone of potential project impacts within the Reconnaissance Study Area revealed the entire impact zone (as depicted in Figure 1) to be within the jurisdiction of the USACE under Section 10 of the Rivers and Harbors Act. This determination was based upon the extent of the impact zone presently at or below mean high water (MHW) such as the slough channels, and includes dry areas and salt ponds that were historically at or below MHW in a natural unobstructed state; this jurisdiction includes all levees within the impact zone. This determination is further supported by the *Preliminary Map of Historic Margins of Marshland* (Nichols and Wright, 1971), in which the entire Reconnaissance Study Area, including Alviso, are depicted as consisting of marshlands.

Wetlands occurring between the MHW and the high tide line that qualify as jurisdiction of the USACE under Section 404 of the Clean Water Act are also expected to occur on site, particularly along the upstream portions of the slough channels. In addition, any wetlands occurring in otherwise upland settings (i.e. empty lots in Alviso) may be subject to both Section 10 and Section 404 jurisdiction. Identification of these areas will require a formal wetland delineation.

HABITATS REGULATED UNDER FISH AND GAME CODE SECTION 1600 ET SEQ.

Regulations Overview. Activities that result in the diversion or obstruction of the natural flow of a stream, or substantially change its bed, channel or bank, or utilize any materials (including vegetation) from the streambed require that the project applicant enter into a Streambed Alteration Agreement with CDFG, under sections 1600–1603 of the California Fish and Game Code. The CDFG potentially extends the definition of stream to include "intermittent and ephemeral streams, rivers, creeks, dry washes, sloughs, blue-line streams mapped on USGS quads, and watercourses with subsurface flows. Canals, aqueducts, irrigation ditches, and other means of water conveyance can also be considered streams if they support aquatic life, riparian vegetation, or stream-dependent terrestrial wildlife" (CDFG 1994).

Survey Results. The bed and banks of Guadalupe and Alviso Sloughs, up to the top-of-bank of the adjacent levees are subject to the regulatory jurisdiction of the CDFG.

IMPACTS OF THE PROPOSED PROJECT

The hydrologic section of the ADEIR describes the existing conditions in the Baylands when subject to a modeled 14,000 cubic foot per second (cfs) storm event. This event is used to establish a baseline. Under these conditions, ponds A5, A7, and A8D are subject to flooding up to depths of 1.8 meters (5.8 feet) and Pond A8W to 2.5 meters (8.1 feet). All of the salt ponds between Alviso and Guadalupe Sloughs would be flooded except for Pond A6. Ponds A12, A13, A15, A17 and A3E are subject to flood depths 0.4 to 1.0 meters (1.4 to 3.3 feet). New Chicago Marsh is subject to flooding up to 2.2 meters (7.2 feet). Pond A3E is subject to minor inundation of 0.003 meters (0.1 feet).

Under baseline conditions of a 14,000 cfs storm event, floodwaters have the potential to displace breeding birds for up to one season depending upon the timing of storm events. Without pumping, water levels in the salt ponds would inundate the flats and levees where breeding of various bird species occurs. However, under existing conditions, excess water is pumped from these salt ponds and from New Chicago Marsh by various parties.. In particular, Cargill pumps or drains ponds A5, A7, and 8W to return water levels to those necessary for salt production. The Santa Clara Valley Water District (SCVWD) pumps Pond A8D after storm events until it is well emptied, to accommodate breeding of Snowy Plovers as required by the U.S. Fish & Wildlife Service. Excess water in New Chicago Marsh is ordinarily evacuated by two large drains, but after major storm events the marsh is also pumped for a few weeks until it is nearly dry.

The Lower Guadalupe River Project proposes to incorporate floodwalls and raise levees upstream of Alviso Slough (Proposed Action, Alternative 2) to accommodate increased flows up to 17,000 cfs downstream of the UPRR bridge. The proposed project would reduce flood depths in New Chicago Marsh by approximately 3 feet. Inundation of ponds A12 and A13 will be reduced by approximately 0.9 meters (0.3 feet); flooding of ponds A15 and A17 is unchanged. However, salt ponds A5, A7, A8D and A8W are expected to flood to depths of approximately 2.1 to 2.9 meters (7.0 to 9.4 feet). These increased depths of flooding will require additional weeks of pumping to reduce water levels to at or below baseline conditions. The increased depth and duration of flooding in the Baylands area due to implementation of the Lower Guadalupe River (LGR) project will result in impacts to various botanical and wildlife resources as described below.

LESS-THAN-SIGNIFICANT IMPACTS

Loss of Habitat for Special-Status Plant Species

Although suitable habitat is present for five special-status plant species within the zone of potential project impacts, all but one have been presumed absent in the project area due to inappropriate microhabitat requirements, limited existing distribution, or poor quality habitat on site. The remaining species, Congdon's Tarplant, has not been observed during recent years within the Reconnaissance Study Area, although it is known to occur in areas of Alviso that are removed from the marsh. This plant is well adapted to a wide range of disturbed environments, from tidally influenced ditches to seasonally wet agricultural fields where it is more common. Based on the fact that the species is unlikely to occur in the impact area, and its adaptability to disturbance, the loss of marsh or ruderal habitat suitable for this species resulting from either temporarily increased water levels or levee modifications is considered a less-than-significant impact.

Impacts to Diked Salt Marsh in New Chicago Marsh due to Reduced Flooding

Under baseline conditions, New Chicago Marsh is potentially subject to inundation of up to 2.2 meters (7.2 feet) deep. The Lower Guadalupe River Project will result in reduced flooding of the Marsh to a level of 1.3 meters (4.3 feet) deep. Therefore, the impact to salt marsh habitat in New Chicago Marsh resulting from the LGR project is considered less than significant. No mitigation is required.

Impacts to Marsh Vegetation within Alviso Slough due to Flooding

The LGR project would result in increased flows in Alviso Slough, downstream of the UPRR. The hydrologic modeling indicates that the increased water surface elevation between the existing conditions during a 14,000 cfs event and the design flow resulting from a 17,000 cfs event is less than 0.15 meters (0.5 feet) from the UPRR bridge to the marina, and that downstream of the marina there will be no increase in water surface elevation. The additional flow downstream of the UPRR bridge to the marina is not expected to affect the various tidal freshwater, brackish, or salt marsh habitats within the slough, all of which are adapted to brief inundation and changes in salinity resulting from freshwater intrusion. Therefore, the impact to marsh habitats within Alviso Slough resulting from the LGR project is considered less than significant.

Impacts on Wildlife due to Increased Flows in Alviso Slough

The LGR project would result in increased flows in Alviso Slough, downstream of the UPRR. The tidal marshes of Alviso and Guadalupe Sloughs are known to support California Clapper Rails and salt marsh harvest mice, as well as other species. The hydrologic modeling indicates that the increase in water surface elevation between the existing conditions during a 14,000 cfs event and the design flow of 17,000 cfs is less than 0.15 meters (0.5 feet) between the UPRR bridge and the marina, and that downstream of the marina there will be no increase in water surface elevation. This relatively minor increase in inundation from the UPRR bridge to the marina is not biologically significant. No significant impacts on special-status species are expected.

Impacts on Wildlife Habitat due to Decreased Flooding in New Chicago Marsh

Under existing conditions, New Chicago Marsh would be flooded to an approximate depth of 2.2 meters (7.2 feet) during a 14,000 cfs event. The inundation will last for several weeks. That depth of flooding is sufficient to temporarily substantially reduce the available salt marsh habitat for the Alameda Song Sparrow and other sensitive species. This impact of flooding occurs under existing conditions. With the improvements of the LGR project in place, the depth of flooding in

New Chicago Marsh would be reduced to 1.3 meters (4.3 feet), approximately 0.9 meters (2.9 feet) less than the existing conditions. It is expected to take less time to empty New Chicago Marsh via the existing methods of two existing drains and turning on the pump. The decreased depth and duration of flooding from project implementation is expected to reduce the effects of flooding on salt marsh habitat. This impact is considered less than significant. No mitigation is needed.

Impacts on Nonbreeding Special-Status Birds due to Increased Flooding in Ponds A5, A7, and A8

Several non-breeding, special-status wildlife species, including Federally or State Endangered and Threatened species, occur downstream of the UPRR bridge and in the salt ponds that lie between Alviso and Guadalupe Sloughs. These species include: California Brown Pelican, Aleutian Canada Goose, Bald Eagle, Peregrine Falcon, California Black Rail, Bank Swallow and Willow Flycatcher. Low numbers of California Brown Pelicans forage opportunistically on salt ponds on seasonally abundant food resources. Aleutian Canada Geese and Bald Eagles are rare winter visitors that do not occur every year. Low numbers of Peregrine Falcons and California Black Rails occur regularly and forage in the project area, with the latter species occurring only during the non-breeding season. Bank Swallows and Willow Flycatchers are rare migrants. The Willow Flycatchers likely represent non-listed races rather than *E. t. extimus* (FE) or *E. t. brewsteri* (SE).

The earlier descriptions of salt pond flooding show that the LGR project has the potential to increase the depth of flooding, and the corresponding duration of flooding, in a number of the salt ponds. Ponds A5, A7 and A8D currently flood to a depth of 1.8 meters (5.8 feet) during a 14,000 cfs event, and Pond A8W floods to a depth of 2.5 meters (8.1 feet). With the implementation of project and the design event of 17,000 cfs, depths in ponds A5, A7 and A8D would increase by an estimated 0.4 meters (1.2 feet) to between 2.0 and 2.1 meters (7.0 to 7.1 feet). Pond A8W will flood to a depth of 2.9 meters (9.4 feet) after the project, for an increased depth of 0.9 meters (1.3 feet).

Although ponds A5, A7, A8D and A8W would be flooded approximately 0.4 meters (1.2 to 1.3 feet) deeper than under existing conditions and could be inundated somewhat longer, the additional inundation is not expected to significantly impact nonbreeding bird species that may forage within the Baylands area. Species that could be affected occur in low density at the project site and would likely find other suitable foraging habitat in the vicinity. This impact is deemed less than significant. No mitigation is needed.

Impacts on Breeding Birds due to Increased Flooding in Ponds A5, A7, and A8W

The earlier descriptions of salt pond flooding show that the LGR project has the potential to increase the depth of flooding, and the corresponding duration of flooding, in a number of the salt ponds. Ponds A5 and A7 currently flood to a depth of 1.8 meters (5.8 feet) during a 14,000 cfs event, and Pond A8W floods to a depth of 2.5 meters (8.1 feet). Shorebirds and terns breed on islands and levees within ponds A5, A7 and A8W. There is a possibility that a late season storm, combined with a slow draw down, could cause the loss of a breeding season's production on these levees. With the implementation of project and the design event of 17,000 cfs, depths in ponds A5 and A7 would increase by an estimated 0.4 meters (1.2 feet) to 2.0 and 2.1 meters (7.0 and 7.1 feet) respectively. Pond A8W will flood to a depth of 2.9 meters (9.4 feet) after the project. Pumping will occur, as under existing conditions, but it will take longer to empty the increased depth and quantity of floodwaters. It becomes more likely that a breeding season will be lost. However, the species that will be affected are expected to be able to find other suitable breeding habitat in the vicinity, and the loss of a single breeding season is not expected to result in lasting impacts to any of the affected populations. Therefore, the incremental increase in the potential that a breeding season will be lost due to increased flooding duration is deemed a less-than-significant impact.

Impacts on Vegetation and Wildlife due to Increased Flooding in Ponds A12, A13, A15, and A17

Under baseline conditions, ponds A15 and A17 receive flows during a 14,000 cfs event resulting in flood depths of 0.4 meters and 1.0 meter respectively (1.4 feet and 3.3 feet). Ponds A12 and A13 are inundated to 0.6 and 0.8 meters respectively (2.1 and 2.5 feet). Improvements associated with the LGRP would reduce the flooding in ponds A12 and A13 to between 0.5 meters and 0.6 meters (1.6 and 1.9 feet) respectively; flooding in ponds A15 and A17 would remain unchanged. Since these changes in water levels are regarded as slight, and the ponds do not otherwise support any sensitive wildlife or plant resources, this flooding constitutes a less-than-significant impact. No mitigation is needed.

Impacts on Salt Marsh Harvest Mouse due to Decreased Flooding in New Chicago Marsh

Under existing conditions, New Chicago Marsh will be flooded to an approximate depth of 2.2 meters (7.2 feet) during a 14,000 cfs event. The inundation will last for several weeks. That depth of flooding is sufficient to substantially reduce or eliminate the existing population of salt marsh harvest mice within the marsh. This marsh hosts a relatively large population of this species. This impact, which already occurs under existing conditions, is significant. It may reduce genetic variability within the surviving population, and make the survivors less able to withstand future challenges. Such flooding is potentially devastating to the salt marsh harvest mouse population, although it has happened in other flood events (1982, 1983) and the population has rebounded. With the improvements of the LGR project in place, the depth of flooding in New Chicago Marsh would be decreased to 1.3 meters (4.3 feet), approximately 0.9 meters (2.9 feet) less than under the existing conditions. The duration of flooding is expected to decrease, since it will not take as long to empty the site via drains and pumping. Although depth and duration of inundation will decrease, flooding may still eliminate the existing population of salt marsh harvest mouse within the marsh, as occurs under the existing conditions. The LGRP does not create any new significant impacts, therefore, no mitigation is needed.

SIGNIFICANT IMPACTS

Impacts on Snowy Plover due to Increased Flooding in Pond A8D

Pond A8D supports a small, but regularly occurring, population of breeding Snowy Plovers. Under existing conditions, about 1.8 meters (5.8 feet) of water would be added to the pond. This water would not evaporate, in time for normal breeding to resume, without assistance. Recently, at the request of the USFWS, the SCVWD has used pumps to drain Pond A8D prior to the breeding season, when necessary. Existing conditions are therefore defined to include pumping that will efficiently remove 1.8 meters (5.8 feet) of water from Pond A8D in time to avoid impacts on Snowy Plover breeding. The LGR project would increase the depth of ponding to 2.1 meters (7.0 feet), an increase of 0.3 meters (1.2 feet) over existing conditions. Even with the recent level of pumping, the increased depth could result in incomplete drainage prior to the onset of breeding, delaying or preventing breeding. That loss of breeding would be a significant effect. Mitigation is required. The following measure would reduce this impact to less than significant.

> **Mitigation Measure 1:** Place temporary 50 cfs pumps in ponds A5, A7, A8W and A8D, providing adequate pumping in Pond A8D to eliminate standing floodwaters in Pond A8D prior to the onset of Snowy Plover breeding.

BAYLANDS MITIGATION MEASURE

The Baylands Mitigation Measure, which will mitigate the LGR project's induced flooding impacts to the Baylands area, is described in detail elsewhere in this document. The Baylands Mitigation Measure includes the following elements:

- Construct a west perimeter levee and/or floodwall around the Alviso to prevent Guadalupe River floodwaters from flowing around the levee system to Alviso. The perimeter levee will include improving the existing levee on the east bank of Alviso Slough from approximately the UPRR trestle downstream to the County Marina.

- Construct an overflow weir on Alviso Slough's west levee to direct Guadalupe River flood flows into ponds A5, A7 and A8. The weir will be located at an existing low spot on the Cargill levee where overtopping already occurs during flood events. Its construction footprint will be approximately 45 meters by 156 meters (484 feet by 1679 feet), including entrance and exit aprons.

- Pump Cargill salt ponds. The District will pump additional flood waters from the Cargill salt ponds to reduce the depth and duration of flood flows in ponds A5, A7, A8D, and A8W to approximately the level of flooding that would be expected in these ponds under existing conditions. Temporary 50 cfs pumps would be operated on each pond for up to 12 days once pumps are operational at pump sites following a flood event. Placement is expected to take approximately 2 weeks. This mitigation measure was judged to be more desirable than previous mitigation concepts involving location of outlet culverts on ponds A5, A7, A8D, and A8W because the District would have more control over the amount of floodwaters evacuated from Cargill ponds with temporary pumping versus use of outlet culverts, and impacts on marsh habitats would be lessened with temporary pumps compared to habitat impacts that would result from outlet culverts.

- Secure permanent flood easements over ponds A5, A7 and A8W and A8D.

- Implement vegetation management actions. The actions include construction of a new maintenance access road on the east bank of the river immediately downstream of the UPRR bridge, removal of all vegetation and the top 1 meter of soil in a 12-meter wide band adjacent to the access road, and removal through use of herbicides of additional vegetation located between the soil-removal band and the channel. The footprint of these actions together totals 15,985 square meters (3.95 acres). This vegetation management is required to prevent induced flooding into Alviso.

The proposed locations of these enhancements are shown in the Draft Environmental Impact Report dated July 2001. The implementation of these mitigation measures will reduce a number of the significant project impacts to a less-than-significant level. The construction and implementation of the Baylands Mitigation Measure itself has the potential to create impacts that are significant. The measures it includes have been developed and described in detail elsewhere. Using those descriptions, an analysis of the potential impacts follows.

IMPACTS OF THE BAYLANDS MITIGATION MEASURE

The following discussion of impacts presents various estimates of area in both hectares and acres, for both jurisdictional and non-jurisdictional habitats. Table 2 provides a summary of these impact acreages in a concise format.

LESS-THAN-SIGNIFICANT IMPACTS

Impacts to Vegetation due to Construction of the Alviso Levee

For construction of the Alviso levee improvements, a portion of the proposed levee enhancement would occur in an area recently upgraded (1990's), another portion would occur in an existing parking lot, and the balance would occur along an existing access road. The design and footprint of the levee to protect Alviso assumes that all of these improvements can be accomplished without impacting any sensitive wetlands, and that the levee raising work will be implemented in the existing top of levee area. The proposed conceptual footprint would occur over 6,100 square meters (1.5 acre) of existing levee surface, and the remaining approximately 59,500 square meters (2.45 acres) would occur over upland and ruderal species. These vegetation types are not considered to be sensitive natural communities and they are common cover types in the Baylands area. No mitigation is required.

Impacts on Wildlife due to Construction of the Alviso Levee

There are no known or suspected rare or sensitive species likely to occur within the footprint of the proposed levee to protect Alviso. Construction of the levee is not expected to disturb marsh vegetation, wetlands, habitat for special-status species, or individuals of special-status species (Construction activities that may have such impacts are addressed below). This impact is deemed less than significant. No mitigation is required.

Impacts on Vegetation and Wildlife due to Increased Flooding in Ponds A12, A13, A15, and A17

Under baseline conditions, ponds A15 and A17 receive flows during a 14,000 cfs event resulting in flood depths of 0.4 meters and 1.0 meter respectively (1.4 feet and 3.3 feet). Ponds A12 and A13 are inundated to depths of 0.6 and 0.8 meters respectively (2.1 and 2.5 feet). Improvements associated with the LGRP would reduce the flooding in ponds A12 and A13 to between 0.5 meters and 0.6 meters (1.6 and 1.9 feet) respectively; flooding in ponds A15 and A17 would remain unchanged. The Baylands Mitigation Measure would not change water levels in ponds A15 or A17. The Baylands Mitigation Measure would slightly increase flooding in ponds A12 and A13 by 0.06 to 0.09 meters (0.2-0.3 feet) deeper than would occur after implementation of the LGRP, but to a depth that is still below baseline conditions. Since these changes in water levels are regarded as slight, and the ponds do not otherwise support any sensitive wildlife or plant resources, this flooding constitutes a less-than-significant impact. No mitigation is needed.

Table 2. Summary of Vegetation Impacts (Acres) of the LGR Baylands Mitigation Plan

	Weir	Levee	Herbicide	Veg. Removal	Maint. Road	Acreage Total
Terrestrial Habitats						
Ruderal/Ruderal Scrub						
Construction Impacts	1.40	3.95	0	0	0.01	5.36
Veg. Maintenance Impacts	0	0	0.07	0	0	0.07
Sediment Management						
Aquatic and Marsh Habitats						
Freshwater Marsh						
Construction Impacts[1]	0	0	0	0	0.10	0.1
Veg. Maintenance Impacts	0	0	3.10	0.30	0	3.4
Sediment Management						
Brackish Marsh						
Construction Impacts[1]	0.10	0	0	0	0.20	0.3
Veg. Maintenance Impacts	0	0	0.02	0.15	0	0.17
Sediment Management						
Salt Marsh						
Construction Impacts[1]	0.03	0	0	0	0	0.03
Veg. Maintenance Impacts						
Sediment Management						
Aquatic (Salt Pond & Slough)						
Construction Impacts[1]	0.20	0	0	0	0	0.2
Veg. Maintenance Impacts						
Sediment Management						
Subtotal, Marsh & Aquatic Habitat Impacts	0.33	0.00	3.12	0.45	0.30	4.2
Subtotal, Marsh & Aquatic Fill	0.33	0.00	0.00	0.00	0.30	0.63

[1] Permanent Impacts

Impacts on Salt Marsh Harvest Mouse

Under existing conditions, New Chicago Marsh would be flooded to an approximate depth of 2.2 meters (7.2 feet). That depth of flooding is sufficient to substantially reduce or eliminate the existing population of salt marsh harvest mice within the marsh, which is known to host a major population of this species. With the improvements of the LGR project in place, the depth of flooding in New Chicago Marsh would be decreased to 1.3 meters (4.3 feet). With implementation of the Baylands Mitigation Measure, depth of flooding in New Chicago Marsh is expected to be further reduced at approximately 1.2 meters (3.9 feet). The Baylands Mitigation Measure is not expected to result in additional impacts on the salt marsh harvest mouse in New Chicago Marsh.

The conceptual design and footprint of the perimeter levee to protect Alviso is located primarily over an existing levee surface and side slopes. At this time, no salt marsh harvest mouse habitat is expected to be lost, since primarily the existing levee surfaces are expected to be affected, and the construction is not expected to disturb any pickleweed-dominated salt marsh vegetation. The impacts of constructing the levee to protect Alviso are therefore deemed less than significant, and no mitigation is needed.

Impacts on California Clapper Rail

The four temporary 50 cfs pumps would be placed on the tops of existing levees and are not expected to impact marsh or aquatic habitats. With three of these locations, there is the potential that California Clapper Rails could be disturbed. The best habitat for the Clapper Rail is primarily in the most bayward locations, i.e., adjoining ponds A6, A7 and A5, but this species has been known from brackish marshes like those that adjoin Pond A8W. The proposed pump site next to Pond A8D is upstream of any known Clapper Rail habitat. Impacts on the California Clapper Rail due to loss of tidal marsh habitat are deemed less than significant.

Equipment movement and noise associated with the placement of the pumps may also lead to potential impacts to California Clapper Rails. Equipment and materials may need to travel down the levees that separate Alviso Slough from ponds A8 and A7, and Guadalupe Slough from ponds A8 and A5. The pumps will likely be placed as far upstream as possible. Nevertheless, operation of the pumps could involve some equipment traffic on these levees while they are being installed and operated. Construction traffic and activities near the pumps will be confined to the levee tops and are not likely to disturb Clapper Rails that reside in habitat areas adjacent to the levees. The impact on the California Clapper Rail due to construction disturbance is deemed less than significant.

Impacts to Ruderal Vegetation due to Construction and Implementation of the Baylands Mitigation Measure

Temporary 50 cfs pumps

The four temporary 50 cfs pumps would be placed on the tops of existing levees and are not expected to impact marsh or aquatic habitats, and constitute a less than significant impact.

Vegetation Management Actions

The vegetation management activities and the construction of a maintenance access road proposed immediately downstream of the UPRR bridge will affect an area of 15,985 square meters (3.95 acres), not including areas of temporary impact due to construction and implementation of these measures. The combined actions are expected to impact ruderal habitats, as well as tidal freshwater and brackish marsh habitats, resulting from the removal of vegetation, herbicide application and maintenance road construction. In particular, the impacts to non-jurisdictional upland areas associated with these actions include approximately 300 square meters (0.07 acre) of ruderal vegetation to be affected by herbicide application, and 40 square meters (0.01 acre) to be affected by the maintenance road. The ruderal vegetation associated with the upland areas of the south bay marshes is common in saline and/or otherwise poor quality soils throughout the region; therefore, the loss of this vegetation constitutes a less-than-significant impact.

Overflow Weir

The installation of the Alviso Slough Overflow Weir in the Cargill levee will have an estimated footprint of 7,020 square meters (75,535 square feet, or 1.73 acres), not including areas of temporary impact. Construction of the weir is expected to permanently impact aquatic and marsh habitat of Pond A8W, as well as ruderal habitat on the levees separating the two. The impacts to non-jurisdictional habitats associated with the weir include approximately 5,650 square meters (1.4 acres) of levees and other uplands supporting a variety of ruderal species including some halophytes. Impacts to ruderal and upland habitats are deemed less than significant because ruderal/upland vegetation is not considered a sensitive natural community, and is common in saline and/or otherwise poor quality soils throughout the region. The actual area of impact to specific habitats depends upon the final design and location of the proposed actions. The conceptual plans that have been proposed are preliminary and features may change in size or location, in which case impacts to habitats will change as well.

SIGNIFICANT IMPACTS

Impacts to Jurisdictional Areas, including Marshes and Aquatic habitats, due to Construction and Implementation of the Baylands Mitigation Measure

Vegetation Management Actions

The vegetation management activities and the construction of a maintenance access road proposed immediately downstream of the UPRR bridge will affect a total area of 15,985 square meters (3.95 acres), not including areas of temporary impact due to construction and implementation of these measures. The combined actions are expected to impact freshwater tidal marsh habitats as well as ruderal habitats resulting from the removal of vegetation, herbicide application and maintenance road construction. In particular, the impacts to jurisdictional marsh habitats associated with these actions include approximately 12,580 square meters (3.12 acres) to be affected by herbicide application, and 1,800 square meters (0.45 acres) to be affected by vegetation removal. These losses of marsh vegetation totaling 14,380 square meters (3.57 acres) will be due to vegetation management, and are not expected to be regarded by USACE as "fill" activities. However, up to 1,200 square meters (0.3 acres) of marsh vegetation may be lost due to construction of the maintenance road; road construction would qualify as a "fill" and would cause permanent vegetation loss. This latter action is considered significant

The conceptual plans that have been proposed for these actions are preliminary and may change in size or location, in which case impacts to habitats will change as well.

Overflow Weir

The installation of the Alviso Slough Overflow Weir will have an estimated footprint of 7,020 square meters (75,535 square feet, or 1.73 acres), not including areas of temporary impact. Construction of the weir is expected to permanently impact tidal marsh habitats along Alviso Slough, a small amount of pickleweed/saline vegetation, aquatic habitat of Pond A8W, and ruderal habitat on the levees separating the two. The impacts to jurisdictional habitats associated with the weir include approximately 800 square meters (0.2 acres) of aquatic habitat, and 520 square meters (0.13 acres) of marsh habitat, based upon the proposed conceptual design. The final area of impact to each habitat type will depend upon the final design and location of the weir, its precise footprint, and specifications of features such as aprons, wing walls, and slope protection.

The permanent impacts to marsh and aquatic habitats as described are considered significant since these habitats are increasingly rare throughout the South Bay region. The sensitive nature of these habitats, as well as their jurisdictional status, will require mitigation. The implementation of the following measure to mitigate for impacts to areas of USACE and DFG jurisdiction would reduce these losses to a less-than-significant impact.

> **Mitigation Measure 1:** Mitigation Measure VI describes replacement of marsh habitat at the Pond A4 site. That mitigation measure will be expanded to include the additional impacts of the Baylands mitigation measure. The additional marsh wetland habitats that will be lost due to the mitigation measures will be replaced at a minimum ratio of 2:1 (replacement: loss).
>
> It is anticipated that marsh habitats lost due to construction of the permanent features associated with the weir, and maintenance access road will fall within USACE jurisdiction and require replacement. These areas are estimated to total 2,549 square meters (0.63 acre). This estimate includes marsh vegetation that is lost due to construction of a permanent feature (road, weir, riprap) but excludes marsh vegetation that is lost due to vegetation removal or herbicide use. Due to the preliminary nature of the proposed conceptual design, and to the absence of a jurisdictional delineation, it should be assumed that the final area of impact may double, for a total impact to USACE jurisdiction of 1.26 acres. Jurisdictional marsh habitats that are lost due to implementation of the Baylands Mitigation Measure will be replaced at a minimum ratio of 2:1 (replacement: loss).
>
> Since temporary impact zones have not yet been designated, and jurisdictional areas in the Baylands have not been delineated, final mitigation acreages within each jurisdiction and within the various habitat types will be reassessed when more detailed information is available.

Impacts on Wildlife due to Disturbance Caused by Construction Activities

Activities relating to construction of the overflow weir, the Alviso levee, the maintenance access road near the UPRR bridge, and vegetation management actions near the UPRR bridge could disturb wildlife in nearby areas. Nearby areas include breeding habitat for certain special-status species, which are discussed separately below. Nearby areas also include breeding habitat for a number of other species of special concern, including Alameda Song Sparrow, Saltmarsh Common Yellowthroat and others. Raptors such as Northern Harriers and White-tailed Kite may be disturbed by construction of the levee and/or floodwall improvements. This impact is deemed significant. The following measure would reduce this impact to less than significant.

> **Mitigation Measure 1:** Schedule construction so that it will not occur during the breeding season of the nearby nesting species.

Impacts on Wildlife from Loss of Habitat due to Construction and Implementation of the Baylands Mitigation Measure

Overflow Weir

The installation of the Alviso Slough Overflow Weir in the Cargill levee will have an estimated footprint of 7,020 square meters (1.73 acres), not including areas of temporary impact. Construction of the weir is expected to cause permanent loss of ruderal upland vegetation, levee area, and brackish tidal marsh vegetation, and to temporarily disturb open water habitat in Pond A8W, as described in preceding sections. The temporary disturbance to open water habitat in the Pond A8W is deemed less than significant because the open water habitat will not be permanently lost and is locally abundant. Loggerhead Shrikes are present and breed in the ruderal upland habitat adjacent to the location of the weir. However, the loss of upland habitat is deemed less than significant because of the high proportion of non-native species contributing to its relatively low habitat value at the proposed weir location. The loss of tidal marsh habitat associated with construction of the weir is deemed significant. Construction of the weir is expected to result in permanent loss of 120 square meters (0.03 acre) of salt marsh and 400 square meters (0.1 acre) of brackish marsh. Alameda Song Sparrows nest in brackish and salt marsh habitats. Saltmarsh Common Yellowthroats nest in freshwater, brackish and salt marsh habitats. These species and others with similar requirements would likely suffer from the loss of habitat. The impact of constructing the weir is therefore deemed significant due to the permanent loss of tidal marsh habitat that would result.

Vegetation Management Actions

The Baylands Mitigation Measure includes construction of a new maintenance access road on the east bank of the river, immediately downstream of the UPRR bridge. The footprint of the road is estimated to be 1,255 square meters (0.3 acres). The top one meter of soil will be removed along a 12-meter wide swath adjacent to the maintenance access road, in an area totaling an estimated 1,825 square meters (0.45 acres). An additional estimated 12,910 square meters (3.19 acres) of vegetation will be removed via use of herbicides. The loss of upland habitat is deemed less than significant because of the high proportion of non-native species contributing to its relatively low habitat value at the proposed location. However, the proposed actions will permanently remove vegetation that provides nesting habitat for resident Saltmarsh Common Yellowthroat and Alameda Song Sparrow. These species and others with similar requirements would likely suffer from the loss of habitat. Based upon the conceptual plan, the impacts are estimated to total 15,662 square meters (3.87 acre) of marsh vegetation, and 324 square meters (0.08 acre) of lost ruderal vegetation. The impact of implementing these actions is deemed significant due to the loss of habitat that would result.

The mitigation measure below would reduce these impacts to less than significant.

> **Mitigation Measure 1:** The loss of marsh habitat would require mitigation in the form of marsh creation. The SCVWD currently is planning tidal restoration at Pond A4, a portion of which could serve as mitigation for loss of habitat due to implementation of the Baylands Mitigation Measure. Mitigation should be at a minimum ratio of 2/1 (acres of mitigation/acres of impact).

Impacts on Salt Marsh Harvest Mouse

The four temporary 50 cfs pumps would be placed on the tops of existing levees and are not expected to impact marsh or aquatic habitats. The overflow weir has an estimated footprint of 7,020 square meters (1.73 acres), excluding areas of temporary impact, and will disturb marsh vegetation. This footprint only includes 121 square meters (0.03 acres) of salt marsh. There is the small possibility that salt marsh harvest mice could be disturbed at this location. The impact of constructing the weir is deemed significant due to loss of habitat for the salt marsh harvest mouse that would result. The mitigation measure below would reduce this impact to less than significant.

> **Mitigation Measure 1:** The loss of tidal marsh habitat would require mitigation in the form of tidal marsh creation. The SCVWD currently is planning such tidal restoration on Pond A4, a portion of which could serve as mitigation for the wier construction. When the final footprint of the impact to tidal marsh habitat has been determined, mitigation should be at a minimum ratio of 2/1 (acres of mitigation/acres of impact). While restoration of pond A4 will not primarily create tidal salt marsh, we assume that there will be a fringe of pickleweed habitats in some locations, sufficient to compensate for salt marsh losses associated with the weir construction.

Impacts on Western Burrowing Owl

The design and footprint of the levee and/or floodwall to protect Alviso has not been finalized, but no Burrowing Owl habitat is expected to be lost, since primarily the levee surfaces are expected to be affected. Very near to the proposed levee are areas that have supported the Burrowing Owl. If Burrowing Owls occur in the immediate vicinity of construction activities, nesting Burrowing Owls could be disturbed. That disturbance would constitute a significant impact.

The installation of the Alviso Slough overflow weir in the Cargill levee has an estimated footprint of 7,020 square meters (1.73 acres). Areas adjacent to the project site are potential Burrowing Owl nesting habitat. If Burrowing Owls occur in the immediate vicinity of construction activities, nesting Burrowing Owls could be disturbed. That disturbance would constitute a significant impact.

The Baylands Mitigation Measure includes construction of a new maintenance access road on the east bank of the river, immediately downstream of the UPRR bridge. The footprint of the road will be 1,760 square meters (0.30 acres). The top, one meter of soil will be removed along a 12-meter wide swath adjacent to the maintenance access road, in an area totaling 1,825 square meters (0.45 acres). An additional 12,910 square meters (3.19 acres) of vegetation will be removed via use of herbicides. Burrowing Owls are known to nest in the outer portion of the levee where this activity will occur. Additionally, areas adjacent to the project site are potential Burrowing Owl nesting habitat. If Burrowing Owls occur in the immediate vicinity of the construction activity, nesting Burrowing Owls could be disturbed. That disturbance would constitute a significant impact.

The mitigation measure below would reduce these impacts to less-than-significant levels.

> **Mitigation Measure 1:** Once the footprint of the improvements has been determined, a survey for potential Burrowing Owl burrows should be conducted. That survey should encompass an area of at least 76 meters (250 feet) from the improvements. Known or suspected nest sites or occupied burrows should be noted. Where possible, timing of improvements should be staged to avoid those areas during the breeding season. If such staging is not possible, then a mitigation agreement would have to be developed with the Department of Fish and Game to allow for pre-breeding season surveys and exclusion of Burrowing Owls from nest sites that could be disturbed by construction.

CUMULATIVE IMPACTS

LESS-THAN-SIGNIFICANT IMPACTS

Interference with Goals of Restoring Tidal Marsh to Broad Areas of Salt Ponds

A number of agencies have established goals related to restoring tidal marsh to areas now occupied by salt ponds. Notably, the Baylands Ecosystems Goals project, an interagency, multidisciplinary group of scientists, shows significant area on both sides of Alviso Slough as targeted for eventual tidal restoration. The structures proposed within the mitigation plan would not necessarily interfere with that eventual restoration, should it come about. The proposed flood control measures will rely upon the use of ponds A5, A7 and A8 for flood-water storage. The Goals project calls for tidal restoration of ponds A5 and A7, as well as A6. If that were to occur, then the remaining ponds (A8W and A8D) would not have the capacity to store floodwaters at a time when high tides occurred.

With or without the proposed project, any marsh restoration efforts would have to take into account this possibility of induced flooding from other areas. Marsh restoration on a broader scale might be one solution. The incremental increase in delivered waters after the project does not significantly increase requirements of flood protection that future marsh restoration would encounter. Therefore, the effect is considered less than significant.

Future Change in Operation of Salt Ponds

Under a current proposal, Cargill may no longer operate ponds A5, A7 and A8 for salt production. If a change in ownership or usage occurs, salt production could cease. Cargill's operational practice of reducing flood levels through post-storm pumping and/or draining in ponds A5, A7 and A8W might not be continued under such a future change in usage. However, pumping of Pond A8D is projected to occur in any future scenario, since is required by U.S. Fish & Wildlife Service to protect breeding Snowy Plovers. Below is a discussion of expected impacts of a future scenario without Cargill salt pond operations, and without implementation of the Baylands Mitigation Measure. It assumes pumping of Pond A8D, no Cargill salt production activity, and no pumping of ponds A5, A7 or A8W except that necessary to reduce water levels below existing internal levees.

The levees separating ponds A5, A7, 8W and 8D are relatively low and would be inundated by floodwaters. Thepumping that occurs currently in Pond A8D would also serve to lower the water levels in adjacent ponds A5, A7 and A8W until the levee that separates A8D is exposed. Therefore, pumping of Pond A8D alone is expected to reduce the duration of inundation in neighboring ponds, but is not expected to do so in time to allow a normal breeding season. Under these conditions, it is possible that a full breeding season in ponds A5, A7 and A8W would be lost. Those species that nest and breed in those ponds would be affected. This impact is an increase above existing conditions, in which a breeding season may or may not be affected. However, the mitigation proposed by the project would reduce this impact by speeding drainage. Cumulatively, the impact would be less than significant.

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APPENDIX A.

PLANT SPECIES OBSERVED ON THE BAYLANDS PORTION OF THE LOWER GUADALUPE RIVER PROJECT SITE

Appendix A. Plants Observed on the Baylands Portion of the Lower Guadalupe River Project Site, Alviso, San Jose and Sunnyvale, California (Reconnaissance Study Area)

FAMILY NAME	SCIENTIFIC NAME	COMMON NAME
Aceraceae	*Acer negundo* ssp. *californica*	California box elder
Aizoceae	*Carpobrotus edulis*	sea marigold
	Mesembryanthemum nodiflorum	slender-leaved iceplant
	Tetragonia tetragonioides	New Zealand spinach
Apiaceae	*Foeniculum vulgare*	sweet fennel
	Conium maculatum	poison hemlock
Asteraceae	*Baccharis pilularis*	coyote brush
	Carduus pycnocephalus	Italian thistle
	Centaurea solstitialis	yellow star-thistle
	Conyza canadensis	horseweed
	Grindelia sp.	gumplant
	Picris echioides	bristly ox-tongue
Brassicaceae	*Brassica nigra*	black mustard
	Hirschfeldia incana	small-pod mustard
	Lepidium latifolium	perennial peppergrass
Caryophyllaceae	*Spergularia macrotheca*	sand-spurrey
Chenopodiaceae	*Atriplex semibaccata*	Australian saltbush
	Atriplex triangularis	spearscale
	Bassia hyssopifolia	five-hook bassia
	Salicornia virginica	common pickleweed
	Salicornia europaea	annual pickleweed
	Salsola iberica	Russian thistle
Cuscutaceae	*Cuscuta salina* var. *major*	salt marsh dodder
Cyperaceae	*Scirpus acutus* var. *occidentalis*	tule
	Scirpus californicus	California bulrush
	Scirpus maritimus	saltmarsh bulrush
	Scirpus robustus	alkali bulrush
Frankeniaceae	*Frankenia salina*	alkali heath
Juglandaceae	*Juglans californica*	California black walnut
Poaceae	*Arundo donax*	giant reed
	Bromus diandrus	ripgut grass
	Bromus hordeaceus	soft chess
	Cortaderia jubata	pampas grass
	Distichlis spicata	saltgrass
	Hordeum sp.	barley
	Polypogon monspeliensis	rabbitsfoot grass
	Spartina foliosa	cordgrass
Polygonaceae	*Polygonum punctatum*	knotweed
Salicaceae	*Populus fremontii*	Fremont's cottonwood
Solanaceae	*Solanum americanum*	deadly nightshade
	Nicotiana glauca	tree-tobacco
Typhaceae	*Typha* sp.	cattail

The species are arranged alphabetically by family name for all vascular plants encountered during the plant survey. Plants are also listed alphabetically within each family. In some cases it was not possible to accurately identify a particular plant to the species level due to the absence of specific anatomic structures required for identification.

APPENDIX B.

WILDLIFE SPECIES OF THE BAYLANDS PORTION OF THE LOWER GUADALUPE RIVER PROJECT SITE, AMPHIBIANS, REPTILES, BIRDS, AND MAMMALS

Vertebrate Species List, Baylands Portion of the Lower Guadalupe River Project Site: Amphibians, Reptiles, Birds and Mammals

Common Name	Scientific Name	Status
CLASS: AMPHIBIA		
ORDER: CAUDATA		
FAMILY: PLETHODONTIDAE (Lungless salamanders)		
Slender Salamander	*Batrachoseps attenuatus*	
ORDER: SALIENTIA (Frogs and Toads)		
FAMILY: BUFONIDAE (True Toads)		
Western Toad	*Bufo boreas*	
FAMILY: HYLIDAE (Treefrogs and Relatives)		
Pacific Treefrog	*Hyla regilla*	
CLASS: REPTILIA		
ORDER: TESTUDINATA (Turtles)		
FAMILY: EMYDIDAE (Pond and Marsh Turtles)		
Western Pond Turtle	*Clemmys marmorata*	CSSC
ORDER: SQUAMATA (Lizards and Snakes)		
SUBORDER: SAURIA (Lizards)		
FAMILY: IGUANIDAE (Iguanids)		
Western Fence Lizard	*Sceloporus occidentalis*	
FAMILY: ANGUIDAE (Alligator Lizards and Relatives)		
Northern Alligator Lizard	*Elgaria coerulea*	
SUBORDER: SERPENTES (Snakes)		
FAMILY: COLUBRIDAE (Colubrids)		
Gopher Snake	*Pituophis melanoleucus*	
Common Garter Snake	*Thamnophis sirtalis*	
CLASS: AVES		
ORDER: GAVIIFORMES (Loons)		
FAMILY: GAVIIDAE (Loons)		
Red-throated Loon	*Gavia stellata*	
Pacific Loon	*Gavia pacifica*	
Common Loon	*Gavia immer*	CSSC
ORDER: PODICIPEDIFORMES (Grebes)		
FAMILY: PODICIPEDIDAE (Grebes)		
Pied-billed Grebe	*Podilymbus podiceps*	
Horned Grebe	*Podiceps auritus*	
Red-necked Grebe	*Podiceps grisegena*	
Eared Grebe	*Podiceps nigricollis*	
Western Grebe	*Aechmophorus occidentalis*	
Clark's Grebe	*Aechmophorus clarkii*	
ORDER: PROCELLARIIFORMES (Albatrosses, Shearwaters, Petrels, and Relatives)		
ORDER: PELECANIFORMES (Tropicbirds, Pelicans, and Relatives)		
FAMILY: PELECANIDAE (Pelicans)		
American White Pelican	*Pelecanus erythrorhynchos*	CSSC
California Brown Pelican	*Pelecanus occidentalis californicus*	FE, SE, SP
FAMILY: PHALACROCORACIDAE (Cormorants)		

Vertebrate Species List, Baylands Portion of the Lower Guadalupe River Project Site: Amphibians, Reptiles, Birds and Mammals

Common Name	Scientific Name	Status
Double-crested Cormorant	*Phalacrocorax auritus*	CSSC
Brandt's Cormorant	*Phalacrocorax penicillatus*	
Pelagic Cormorant	*Phalacrocorax pelagicus*	
ORDER: CICONIIFORMES (Herons, Storks, Ibises, and Relatives)		
FAMILY: ARDEIDAE (Herons and Bitterns)		
American Bittern	*Botaurus lentiginosus*	CSSC
Great Blue Heron	*Ardea herodias*	CSSC
Great Egret	*Ardea alba*	CSSC
Snowy Egret	*Egretta thula*	CSSC
Little Blue Heron	*Egretta caerulea*	
Cattle Egret	*Bubulcus ibis*	
Green Heron	*Butorides striatus*	
Black-crowned Night Heron	*Nycticorax nycticorax*	CSSC
FAMILY: CATHARTIDAE (New World Vultures)		
Turkey Vulture	*Cathartes aura*	
FAMILY: THRESKIORNITHIDAE (Ibises and Spoonbills)		
White-faced Ibis	*Plegadis chihi*	CSSC
ORDER: ANSERIFORMES (Screamers, Ducks, and Relatives)		
FAMILY: ANATIDAE (Swans, Geese, and Ducks)		
Tundra Swan	*Cygnus columbianus*	
Greater White-fronted Goose	*Anser albifrons*	
Snow Goose	*Chen caerulescens*	
Ross' Goose	*Chen rossii*	
Canada Goose	*Branta canadensis*	
Aleutian Canada Goose	*Branta canadensis leucopareia*	FT
Wood Duck	*Aix sponsa*	
Gadwall	*Anas strepera*	
Eurasian Widgeon	*Anas penelope*	
American Widgeon	*Anas americana*	
Green-winged Teal	*Anas crecca*	
Mallard	*Anas platyrhynchos*	
Blue-winged Teal	*Anas discors*	
Cinnamon Teal	*Anas cyanoptera*	
Northern Shoveler	*Anas clypeata*	
Northern Pintail	*Anas acuta*	
Canvasback	*Aythya valisineria*	CSSC
Redhead	*Aythya americana*	
Ring-necked Duck	*Aythya collaris*	
Greater Scaup	*Aythya marila*	
Lesser Scaup	*Aythya affinis*	
Surf Scoter	*Melanitta perspicillata*	
White-winged Scoter	*Melanitta fusca*	
Oldsquaw	*Clangula hyemalis*	
Bufflehead	*Bucephala albeola*	
Common Goldeneye	*Bucephala clangula*	
Common Merganser	*Mergus merganser*	
Red-breasted Merganser	*Mergus serrator*	
Ruddy Duck	*Oxyura jamaicensis*	
ORDER: FALCONIFORMES (Old World Vultures, Hawks, and Falcons)		
FAMILY: ACCIPITRIDAE (Hawks, Old World Vultures, and Harriers)		
Osprey	*Pandion haliaetus*	CSSC

Vertebrate Species List, Baylands Portion of the Lower Guadalupe River Project Site: Amphibians, Reptiles, Birds and Mammals

Common Name	Scientific Name	Status
White-tailed Kite	*Elanus caeruleus*	SP
Bald Eagle	*Haliaeetus leucocephalus*	FT, SE, SP
Northern Harrier	*Circus cyaneus*	CSSC
Sharp-shinned hawk	*Accipiter striatus*	CSSC
Cooper's Hawk	*Accipiter cooperii*	CSSC
Red-shouldered Hawk	*Buteo lineatus*	
Red-tailed Hawk	*Buteo jamaicensis*	
Ferruginous Hawk	*Buteo regalis*	CSSC
Rough-legged Hawk	*Buteo lagopus*	
Golden Eagle	*Aquila chrysaetos*	CSSC, SP
FAMILY: FALCONIDAE (Caracaras and Falcons)		
American Kestrel	*Falco sparverius*	
Merlin	*Falco columbarius*	CSSC
Peregrine Falcon	*Falco peregrinus*	
Prairie Falcon	*Falco mexicanus*	CSSC
ORDER: GALLIFORMES (Megapodes, Currassows, Pheasants, and Relatives)		
FAMILY: PHASIANIDAE (Old World Quails, Pheasants, and Relatives)		
Ring-necked Pheasant	*Phasianus colchicus*	
California Quail	*Callipepla californica*	
ORDER: GRUIFORMES (Cranes, Rails, and Relatives)		
FAMILY: RALLIDAE (Rails, Gallinules, and Coots)		
California Black Rail	*Laterallus jamaicensis coturniculus*	ST, SP
California Clapper Rail	*Rallus longirostris obsoletus*	FE, SE, SP
Virginia Rail	*Rallus limicola*	
Sora	*Porzana carolina*	
Common Moorhen	*Gallinula chloropus*	
American Coot	*Fulica americana*	
FAMILY: GRUIDAE (Cranes)		
Sandhill Crane	*Grus canadensis*	
ORDER: CHARADRIIFORMES (Shorebirds, Gulls, and Relatives)		
FAMILY: CHARADRIIDAE (Plovers and Relatives)		
Black-bellied Plover	*Pluvialis squatarola*	
American Golden-Plover	*Pluvialis dominica*	
Pacific Golden-Plover	*Pluvialis fulva*	
Western Snowy Plover	*Charadrius alexandrinus nivosus*	FT (coastal), CSSC
Semipalmated Plover	*Charadrius semipalmatus*	
Killdeer	*Charadrius vociferus*	
FAMILY: RECURVIROSTRIDAE (Avocets and Stilts)		
Black-necked Stilt	*Himantopus mexicanus*	
American Avocet	*Recurvirostra americana*	
FAMILY: SCOLOPACIDAE (Sandpipers and Relatives)		
Greater Yellowlegs	*Tringa melanoleuca*	
Lesser Yellowlegs	*Tringa flavipes*	
Solitary Sandpiper	*Tringa solitaria*	
Willet	*Catoptrophorus semipalmatus*	
Spotted Sandpiper	*Actitis macularia*	
Whimbrel	*Numenius phaeopus*	
Long-billed Curlew	*Numenius americanus*	CSSC
Marbled Godwit	*Limosa fedoa*	

Vertebrate Species List, Baylands Portion of the Lower Guadalupe River Project Site: Amphibians, Reptiles, Birds and Mammals

Common Name	Scientific Name	Status
Ruddy Turnstone	*Arenaria interpres*	
Red Knot	*Calidris canutus*	
Sanderling	*Calidris alba*	
Semipalmated Sandpiper	*Calidris pusilla*	
Western Sandpiper	*Calidris mauri*	
Least Sandpiper	*Calidris minutilla*	
Baird's Sandpiper	*Calidris bairdii*	
Pectoral Sandpiper	*Calidris melanotos*	
Dunlin	*Calidris alpina*	
Stilt Sandpiper	*Calidris himantopus*	
Ruff	*Philomachus pugnax*	
Short- billed Dowitcher	*Limnodromus griseus*	
Long-billed Dowitcher	*Limnodromus scolopaceus*	
Common Snipe	*Gallinago gallinago*	
Wilson's Phalarope	*Phalaropus tricolor*	
Red-necked Phalarope	*Phalaropus lobatus*	
Red Phalarope	*Phalaropus fulicaria*	
FAMILY: LARIDAE (Gulls and Terns)		
Franklin's Gull	*Larus pipixcan*	
Little Gull	*Larus minutus*	
Black-headed Gull	*Larus ridibundus*	
Bonaparte's Gull	*Larus philadelphia*	
Heermann's Gull	*Larus heermanni*	
Mew Gull	*Larus canus*	
Ring-billed Gull	*Larus delawarensis*	
California Gull	*Larus californicus*	CSSC
Herring Gull	*Larus argentatus*	
Thayer's Gull	*Larus thayeri*	
Lesser Black-backed Gull	*Larus fuscus*	
Western Gull	*Larus occidentalis*	
Glaucous-winged Gull	*Larus glaucescens*	
Glaucous Gull	*Larus hyperboreus*	
Sabine's Gull	*Xema sabini*	
Caspian Tern	*Sterna caspia*	CSSC
Common Tern	*Sterna hirundo*	
Forster's Tern	*Sterna forsteri*	CSSC
California Least Tern	*Sterna antillarum browni*	FE, SE, SP
Black Tern	*Chlidonias niger*	CSSC
Black Skimmer	*Rynchops niger*	CSSC
FAMILY: ALCIDAE (Auks, Murres, and Puffins)		
Common Murre	*Uria aalge*	
ORDER: COLUMBIFORMES (Pigeons and Doves)		
FAMILY: COLUMBIDAE (Pigeons and Doves)		
Rock Dove	*Columba livia*	
Mourning Dove	*Zenaida macroura*	
ORDER: STRIGIFORMES (Owls)		
FAMILY: TYTONIDAE (Barn Owls)		
Barn Owl	*Tyto alba*	
FAMILY: STRIGIDAE (Typical Owls)		
Great Horned Owl	*Bubo virginianus*	
Burrowing Owl	*Athene cunicularia*	CSSC

Vertebrate Species List, Baylands Portion of the Lower Guadalupe River Project Site: Amphibians, Reptiles, Birds and Mammals

Common Name	Scientific Name	Status
Short-eared Owl	*Asio flammeus*	CSSC
ORDER: CAPRIMULGIFORMES (Goatsuckers and Relatives)		
FAMILY: CAPRIMULGIDAE (Goatsuckers)		
Common Poor-will	*Phalaenoptilus nuttallii*	
ORDER: APODIFORMES (Swifts and Hummingbirds)		
FAMILY: APODIDAE (Swifts)		
Vaux's Swift	*Chaetura vauxi*	CSSC
White-throated Swift	*Aeronautes saxatalis*	
FAMILY: TROCHILIDAE (Hummingbirds)		
Anna's Hummingbird	*Calypte anna*	
Rufous Hummingbird	*Selasphorus rufus*	CSSC
Allen's Hummingbird	*Selasphorus sasin*	
ORDER: CORACIIFORMES (Kingfishers and Relatives)		
FAMILY: ALCEDINIDAE (Kingfishers)		
Belted Kingfisher	*Ceryle alcyon*	
ORDER: PICIFORMES (Woodpeckers and Relatives)		
FAMILY: PICIDAE (Woodpeckers)		
Red-breasted Sapsucker	*Sphyrapicus ruber*	
Nuttall's Woodpecker	*Picoides nuttallii*	
Downy Woodpecker	*Picoides pubescens*	
Northern Flicker	*Colaptes auratus*	
ORDER: PASSERIFORMES (Perching Birds)		
FAMILY: TYRANNIDAE (Tyrant Flycatchers)		
Olive-sided Flycatcher	*Contopus cooperi*	
Western Wood-Pewee	*Contopus sordidulus*	
Willow Flycatcher	*Empidonax traillii*	**FE** (extimus) **SE** (traillii ssp.)
Gray Flycatcher	*Empidonax wrightii*	
Pacific-slope Flycatcher	*Empidonax difficilis*	
Black Phoebe	*Sayornis nigricans*	
Say's Phoebe	*Sayornis saya*	
Ash-throated Flycatcher	*Myiarchus cinerascens*	
Tropical Kingbird	*Tyrannus melancholicus*	
Western Kingbird	*Tyrannus verticalis*	
FAMILY: LANIIDAE (Shrikes)		
Loggerhead Shrike	*Lanius ludovicianus*	CSSC
FAMILY: VIREONIDAE (Typical Vireos)		
Cassin's Vireo	*Vireo cassinii*	
Warbling Vireo	*Vireo gilvus*	
FAMILY: CORVIDAE (Jays, Magpies, and Crows)		
Western Scrub-jay	*Aphelocoma californica*	
American Crow	*Corvus brachyrhynchos*	
Common Raven	*Corvus corax*	
FAMILY: ALAUDIDAE (Larks)		
California Horned Lark	*Eremophila alpestris actia*	CSSC
FAMILY: HIRUNDINIDAE (Swallows)		
Tree Swallow	*Tachycineta bicolor*	
Violet-green Swallow	*Tachycineta thalassina*	

Vertebrate Species List, Baylands Portion of the Lower Guadalupe River Project Site: Amphibians, Reptiles, Birds and Mammals

Common Name	Scientific Name	Status
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	
Cliff Swallow	*Petrochelidon pyrrhonota*	
Bank Swallow	*Riparia riparia*	ST
Barn Swallow	*Hirundo rustica*	
FAMILY: PARIDAE (Titmice)		
Chestnut-backed Chickadee	**Poecile rufescens**	
FAMILY: AEGITHALIDAE (Bushtit)		
Bushtit	*Psaltriparus minimus*	
SITTIDAE (Nuthatches)		
Red-breasted Nuthatch	*Sitta canadensis*	
FAMILY: TROGLODYTIDAE (Wrens)		
Rock Wren	*Salpinctes obsoletus*	
Bewick's Wren	*Thryomanes bewickii*	
House Wren	*Troglodytes aedon*	
Winter Wren	*Troglodytes troglodytes*	
Marsh Wren	*Cistothorus palustris*	
FAMILY: REGULIDAE (Kinglets)		
Golden-crowned Kinglet	*Regulus satrapa*	
Ruby-crowned Kinglet	*Regulus calendula*	
FAMILY: SYLVIIDAE (Old World Warblers and Gnatcatchers)		
Blue-gray Gnatcatcher	*Polioptila caerulea*	
FAMILY: TURDIDAE (Solitaires, Thrushes, and Allies		
Swainson's Thrush	*Catharus ustulatus*	
Hermit Thrush	*Catharus guttatus*	
American Robin	*Turdus migratorius*	
FAMILY: TIMALIIDAE (Babblers)		
Wrentit	*Chamaea fasciata*	
FAMILY: MIMIDAE (Mockingbirds and Thrashers)		
Northern Mockingbird	*Mimus polyglottos*	
California Thrasher	*Toxostoma redivivum*	
Sage Thrasher	**Oreoscoptes montanus**	
FAMILY: STURNIDAE (Starlings)		
European Starling	*Sturnus vulgaris*	
FAMILY: MOTACILLIDAE (Wagtails and Pipits)		
Black-backed Wagtail	*Motacilla lugens*	
American Pipit	*Anthus rubescens*	
FAMILY: BOMBYCILLIDAE (Waxwings)		
Cedar Waxwing	*Bombycilla cedrorum*	
FAMILY: PARULIDAE (Wood Warblers)		
Orange-crowned Warbler	*Vermivora celata*	
Nashville Warbler	*Vermivora ruficapilla*	
Yellow Warbler	*Dendroica petechia*	CSSC
Yellow-rumped Warbler	*Dendroica coronata*	
Black-throated Gray Warbler	*Dendroica nigrescens*	
Townsend's Warbler	*Dendroica townsendi*	CSSC
Palm Warbler	*Dendroica palmarum*	
American Redstart	*Setophaga ruticilla*	
Northern Waterthrush	**Seiurus motacilla**	

Vertebrate Species List, Baylands Portion of the Lower Guadalupe River Project Site: Amphibians, Reptiles, Birds and Mammals

Common Name	Scientific Name	Status
MacGillivray's Warbler	**Oporornis tolmiei**	
Saltmarsh Common Yellowthroat	*Geothlypis trichas sinuosa*	CSSC
Wilson's Warbler	*Wilsonia pusilla*	
FAMILY: THRAUPIDAE (Tanagers)		
Western Tanager	*Piranga ludoviciana*	
FAMILY: EMBERIZIDAE (Emberizines)		
Green-tailed Towhee	*Pipilo chlorurus*	
Spotted Towhee	*Pipilo maculatus*	
California Towhee	*Pipilo crissalis*	
Chipping Sparrow	*Spizella passerina*	CSSC
Clay-colored Sparrow	*Spizella pallida*	
Brewer's Sparrow	*Spizella breweri*	
Vesper Sparrow	*Pooecetes gramineus*	
Lark Sparrow	*Chondestes grammacus*	
Savannah Sparrow	*Passerculus sandwichensis*	
Fox Sparrow	*Passerella iliaca*	
Song Sparrow	*Melospiza melodia*	
Alameda Song Sparrow	*Melospiza melodia pusillula*	CSSC
Lincoln's Sparrow	*Melospiza lincolnii*	
Swamp Sparrow	*Melospiza georgiana*	
White-throated Sparrow	*Zonotrichia albicollis*	
White-crowned Sparrow	*Zonotrichia leucophrys*	
Golden-crowned Sparrow	*Zonotrichia atricapilla*	
Dark-eyed Junco	*Junco hyemalis*	
FAMILY: CARDINALIDAE (Cardinals, Grosbeaks, and Relatives)		
Black-headed Grosbeak	*Pheucticus melanocephalus*	
Lazuli Bunting	*Passerina amoena*	
FAMILY: ICTERIDAE (Icterines)		
Red-winged Blackbird	*Agelaius phoeniceus*	
Tricolored Blackbird	*Agelaius tricolor*	CSSC
Western Meadowlark	*Sturnella neglecta*	
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*	CSSC
Brewer's Blackbird	*Euphagus cyanocephalus*	
Brown-headed Cowbird	*Molothrus ater*	
Hooded Oriole	*Icterus cucullatus*	
Baltimore Oriole	*Icterus galbula*	
Bullock's Oriole	*Icterus bullockii*	
FAMILY: FRINGILLIDAE (Finches)		
Purple Finch	*Carpodacus purpureus*	
House Finch	*Carpodacus mexicanus*	
Lawrence's Goldfinch	*Carduelis lawrencei*	
Pine Siskin	*Carduelis pinus*	
Lesser Goldfinch	*Carduelis psaltria*	
American Goldfinch	*Carduelis tristis*	
FAMILY: PASSERIDAE (Weaver Finches)		
House Sparrow	*Passer domesticus*	
CLASS: MAMMALIA		
ORDER: INSECTIVORA (Shrews and Moles)		
FAMILY: SORICIDAE (Shrews)		
Salt Marsh Wandering Shrew	*Sorex vagrans halicoetes*	CSSC

Vertebrate Species List, Baylands Portion of the Lower Guadalupe River Project Site: Amphibians, Reptiles, Birds and Mammals

Common Name	Scientific Name	Status
Ornate Shrew	*Sorex ornatus*	
FAMILY: TALPIDAE (Moles)		
Broad-footed Mole	*Scapanus latimanus*	
ORDER: CHIROPTERA (Bats)		
FAMILY: VESPERTILIONIDAE (Vespertilionid Bats)		
Pallid Bat	*Antrozous pallidus*	CSSC
Yuma Myotis	*Myotis yumanensis*	
Big Brown Bat	*Eptesicus fuscus*	
Western Red Bat	*Lasiurus blossevillii*	
Hoary Bat	*Lasiurus cinereus*	
FAMILY: MOLOSSIDAE (Free-tailed Bat)		
Brazilian Free-tailed Bat	*Tadarida brasiliensis*	
ORDER: LAGOMORPHA (Rabbits, Hares, and Pikas)		
FAMILY: LEPORIDAE (Rabbits and Hares)		
Desert Cottontail	*Sylvilagus audubonii*	
Black-tailed Hare	*Lepus californicus*	
ORDER: RODENTIA (Squirrels, Rats, Mice, and Relatives)		
FAMILY: SCIURIDAE (Squirrels, Chipmunks, and Marmots)		
California Ground Squirrel	*Spermophilus beecheyi*	
FAMILY: GEOMYIDAE (Pocket Gophers)		
Botta's Pocket Gopher	*Thomomys bottae*	
FAMILY: CRICETIDAE (Deer Mice, Voles, and Relatives)		
Western Harvest Mouse	*Reithrodontomys megalotis*	
Salt Marsh Harvest Mouse	*Reithrodontomys raviventris*	FE, SE, SP
Deer Mouse	*Peromyscus maniculatus*	
Muskrat	*Ondatra zibethicus*	
FAMILY: MURIDAE (Old World Rats and Mice)		
Norway Rat	*Rattus norvegicus*	
House Mouse	*Mus musculus*	
ORDER: CARNIVORA (Carnivores)		
FAMILY: CANIDAE (Foxes, Wolves, and Relatives)		
Coyote	*Canis latrans*	
Red Fox	*Vulpes vulpes*	
Gray Fox	*Urocyon cinereoargenteus*	
FAMILY: PROCYONIDAE (Raccoons and Relatives)		
Raccoon	*Procyon lotor*	
FAMILY: MUSTELIDAE (Weasels, Badgers, and Relatives)		
Long-tailed Weasel	*Mustela frenata*	
Western Spotted Skunk	*Spilogale gracilis [=putorius]*	
River Otter	*Lutra canadensis*	
FAMILY: FELIDAE (Cats)		
House Cat	*Felis catus*	
FAMILY: OTARIIDAE (Eared Seals)		
California Sea Lion	*Zalophus californianus*	
FAMILY: PHOCIDAE (Hair Seals)		
Harbor Seal	*Phoca vitulina*	

Appendix F

Downtown Guadalupe River Cumulative Impact Analyses (February 2001)

CHAPTER 6

Cumulative Impacts and Other Required Analyses

6.1 Introduction

This chapter analyzes the cumulative impacts on the Guadalupe River system of the:

- Guadalupe River Project with Bypass System Alternative and other past, present, and reasonably foreseeable future actions
- Guadalupe River Project with Refined Bypass System Alternative (Proposed Action) and other past, present, and reasonably foreseeable future actions
- No-Action Alternative and other past, present, and reasonably foreseeable future actions
- This chapter also addresses other required analyses, including the:
- Relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity with implementation of the Guadalupe River Project with Refined Bypass System Alternative
- Irreversible or irretrievable commitments of resources related to the Guadalupe River Project with Refined Bypass System Alternative
- Growth-inducing impacts of the Guadalupe River Project with Refined Bypass System Alternative
- Identification of the environmentally preferred and environmentally superior alternative

For the purposes of this assessment, the Guadalupe River system is considered to encompass the Guadalupe River main stem from its mouth at Alviso Slough in southern San Francisco Bay to its confluence with Alamitos and Guadalupe Creeks, as well as the following major tributaries of the Guadalupe River: Los Gatos Creek, Canoas Creek, Ross Creek, Guadalupe Creek, Alamitos Creek, and Arroyo Calero. The study areas for Los Gatos Creek, Guadalupe Creek, Alamitos Creek, and Arroyo Calero extend upstream to their respective reservoirs (Figure 6.1-1 and Table 6.1-1).

6.2 Cumulative Impacts – Bypass System Alternative and Other Guadalupe River Projects

The term "cumulative impacts" refers to the net impact of two or more individual impacts that, when evaluated together, are considerable or compound or increase other environmental impacts. The cumulative impact of several projects is the change in the environment that results from the incremental impact of a Bypass System Alternative when added to the incremental impacts of other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions.

TABLE 6.1-1. Stream Segments Included in the Cumulative Impact Assessment for Biotic Resources

Stream	Segment	Total Stream Miles
Guadalupe River	Alviso Slough (UPRR Bridge) to confluence with Alamitos Creek	18.8
Los Gatos Creek	Confluence with Guadalupe River to Lexington Reservoir	11.0
Canoas Creek	Confluence with Guadalupe River to Cottle Avenue	7.6
Ross Creek	Confluence with Guadalupe River to Kennedy Road	5.6
Guadalupe Creek	Confluence with Guadalupe River to Guadalupe Reservoir	5.5
Alamitos Creek	Confluence with Guadalupe River to Arroyo Calero to Almaden Reservoir	7.2
Arroyo Calero	Confluence with Alamitos Creek to Calero Reservoir	4.0
Total		**59.7**

Source: The Habitat Restoration Group, 1991 (unpublished data).

This section first identifies and describes projects other than the Bypass System Alternative that have been approved or are under construction in the Guadalupe River watershed. Cumulative impacts will be addressed for these projects. Related projects that are under consideration are also described, although the quantitative impacts of these projects are not known at this time.

Cumulative impacts and mitigation measures are first discussed for the entire Guadalupe River Project with Bypass System Alternative, including the incremental impacts of the Bypass System Alternative, in combination with other projects in the Guadalupe River watershed. Cumulative impacts and mitigation measures are then addressed for the Refined Bypass System Alternative in combination with other projects in the Guadalupe River watershed. Next, cumulative impacts and mitigation measures are addressed for the No-Action Alternative in combination with other projects in the Guadalupe River watershed. Cumulative impacts are discussed for each resource addressed in this Report.

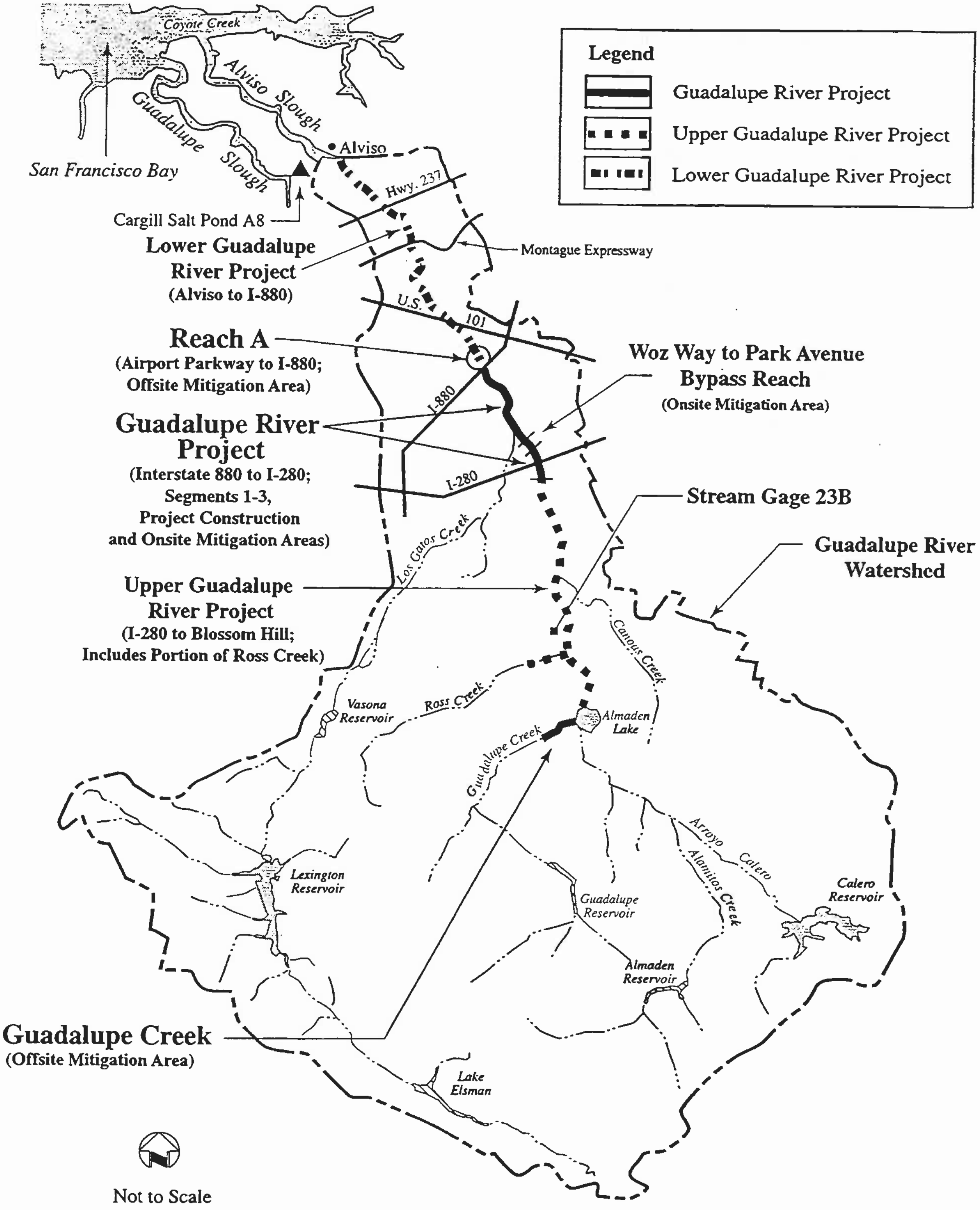

Legend
Guadalupe River Project
Upper Guadalupe River Project
Lower Guadalupe River Project
Coyote Creek
Alviso Slough
Guadalupe Slough
San Francisco Bay
Alviso
Hwy. 237
Cargill Salt Pond A8
Lower Guadalupe River Project (Alviso to I-880)
Montague Expressway
U.S. 101
Reach A (Airport Parkway to I-880; Offsite Mitigation Area)
Woz Way to Park Avenue Bypass Reach (Onsite Mitigation Area)
I-880
Guadalupe River Project (Interstate 880 to I-280; Segments 1-3, Project Construction and Onsite Mitigation Areas)
I-280
Stream Gage 23B
Los Gatos Creek
Guadalupe River Watershed
Upper Guadalupe River Project (I-280 to Blossom Hill; Includes Portion of Ross Creek)
Canoas Creek
Vasona Reservoir
Ross Creek
Almaden Lake
Guadalupe Creek
Arroyo Calero
Alamitos Creek
Lexington Reservoir
Guadalupe Reservoir
Calero Reservoir
Almaden Reservoir
Guadalupe Creek (Offsite Mitigation Area)
Lake Elsman
N
Not to Scale

Figure 6.1-1. Guadalupe River Watershed Including Project Construction and Mitigation Areas

6.2.1 Projects Addressed in the Cumulative Impact Analyses

Eighteen major projects in the Guadalupe River system have been approved, are under construction, or have been proposed by other public agencies:

- Guadalupe River Park Project
- State Route 87 Freeway Upgrade Project from Highway 101 to Julian Street
- State Route 85 Transportation Corridor Project
- San Jose International Airport Expansion Plan
- Santa Clara Valley Water District Fish Ladder Construction Program
- Guadalupe Creek Restoration Project
- Upper Guadalupe River Flood Control Project
- Lower Guadalupe River Flood Protection Project
- Stormwater Pump Installations
- Virginia Street Bank Stabilization Project
- Santa Clara Valley Water District Stream Maintenance Program
- Alviso Ring Levee Wetland Mitigation and Restoration Project
- Almaden Quicksilver County Park Project
- Boston Property Project
- John P. McEnery Park Site Improvements
- Los Gatos Creek Trail Project
- Vasona Light Rail Extension Project
- CORE Location Project

When combined with the Guadalupe River Project with Bypass System Alternative, these projects have the potential to produce cumulative impacts on resources in the project area and are therefore addressed in this cumulative impact analysis. These projects are discussed in detail below.

6.2.1.1 Guadalupe River Park Project

This project is a master plan for the development of recreational facilities along the Guadalupe River. In 1988, the City developed a Guadalupe River Park Master Plan and prepared an EIR for a regional urban river park along the Guadalupe River between I-280 and I-880 (City of San Jose, 1989). The 1988 Guadalupe River Park Master Plan included an almost continuous river walk between I-280 and I-880 on both the east and west banks of the river, access points at the intersections of roadways and the river walk, and a waterfall at the outlet of the Woz Way to Park Avenue bypass reach.

In 1991, the Corps and SCVWD prepared an EA/IS to address modifications to the Authorized Project (U.S. Army Corps of Engineers, 1991a). The EA/IS assessed the additional impacts on land use, riparian corridor vegetation, and fish and wildlife habitat that would result from the trail construction and recreational use associated with the Guadalupe River Park Project. Twenty-two residences and six businesses were relocated.

Key modifications included replacing concrete floodwalls and riprapped side slopes with planted gabion and stone terraces as well as components of the 1988 Guadalupe River Park Master Plan described above. In 1995, the City of San Jose Redevelopment Agency developed a revised Guadalupe River Park Master Plan that was "overlaid" on the Corps' Authorized Project (San Jose Redevelopment Agency, 1995). Under this plan, portions of the proposed park were expanded downstream from the confluence of the Guadalupe River and Los Gatos Creek, and trail and access point locations were refined. The City of San Jose Redevelopment Agency has already constructed portions of the Guadalupe River Park Project. The Woz Way to Park Avenue river walk, which has been completed, consists of a system of trails along the tops of the banks of the Guadalupe River between Woz Way and Park Avenue (Figure 3.4-9). The Confluence Point and West project, located at the confluence of Los Gatos Creek and the Guadalupe River, includes a park, trails, riverbank gabions, and a pedestrian bridge over Los Gatos Creek (Talbot, pers. comm.). The Confluence Point and West project has been completed except for the pedestrian bridge.

The Guadalupe River Project with Bypass System Alternative includes components of the Guadalupe River Park Project, as described in Section 3.4, "Bypass System Alternative (Action Bypass)," and shown in Figure 3.4-1. Those portions of the Guadalupe River Park Plan that have already been constructed and the components included in the Guadalupe River Project with Bypass System Alternative are evaluated in this cumulative impacts analysis.

The City is presently revising specific design components of the Guadalupe River Park Project in Segments 3A and 3B. The Guadalupe River Park Master Plan is not being revised. Potential impacts of trail system development and recreational use will be addressed in an EIR when the park master plan is finalized. These impacts could include disturbance of wildlife and trampling of existing riparian vegetation and riparian revegetation areas.

6.2.1.2 State Route 87 Freeway Upgrade Project

The State Route 87 Freeway Upgrade Project will convert the existing four-lane Guadalupe Parkway (State Route 87) to a six-lane freeway between Julian Street and Highway 101 and includes the construction of the Skyport Bridge. State Route 87 improvements are designed to relieve severe congestion along Guadalupe Parkway and to improve access to downtown San Jose, the Civic Center area, and San Jose International Airport. The target date for completion of the State Route 87 Freeway Upgrade Project is December 2003 (Gonzales, pers. comm.). SCVWD has been a full member of the State Route 87 Project Development Team since 1987. Over the past 13 years, SCVWD staff has participated in numerous State Route 87 meetings and workshops, especially those regarding locations where the freeway project interfaces with the Guadalupe River. The Corps and SCVWD will continue to coordinate with the California Department of Transportation and the Valley Transportation Authority on the design and construction activities of the Guadalupe River Project and the State Route 87 Freeway Upgrade Project.

Freeway widening and bridge construction from Highway 101 to New Julian Street resulting from implementation of the State Route 87 Freeway Upgrade Project will affect 1.09 acres of wetlands under the jurisdiction of the Corps and 5.72 acres of riparian habitat. The project includes construction of a top-of-bank trail along the east bank of Segments 1 and 2 of the Guadalupe River. Construction began in 1999 and will be completed in 2003. This project will have no long-term impacts on fish resources.

Mitigation for loss of riparian habitat and wetlands that would result from the State Route 87 Freeway Upgrade Project requires the planting of 10.95 acres of riparian habitat adjacent to the east side of the Guadalupe River (David Powers and Associates, 1993, Vincent, pers. comm. , Hessler, pers. comm.).

6.2.1.3 State Route 85 Transportation Corridor Project

The State Route 85 Transportation Corridor Project was completed in 1996. It directly affected 0.1 acre of riparian vegetation along the main stem Guadalupe River and indirectly affected 4.5 acres on Los Gatos and Ross Creeks. Mitigation for the loss of riparian habitat required the planting of 12.1 acres of riparian vegetation onsite and 0.2 acre offsite (Monette, pers. comm.). Bridge construction under this project did not adversely affect fisheries, and fish passage was provided to ensure that there would be no adverse impacts on fish resources in Ross Creek (Monette, pers. comm.).

6.2.1.4 San Jose International Airport Expansion Plan

The San Jose International Airport Expansion Plan includes construction between 2002 and 2004 of a consolidated rental car garage on the east side of the Guadalupe River at the downstream end of Reach A and construction in 2001 of a two-lane access bridge to the rental car garage approximately 1,200 feet downstream from Airport Parkway that will connect Airport Boulevard and the existing parking lot/future garage. No impacts on riparian vegetation or wetlands are expected.

6.2.1.5 Santa Clara Valley Water District Fish Ladder Construction Program

SCVWD has almost completed a comprehensive program to remove barriers to fish and/or install fish ladders at barriers on Upper Penitencia Creek, Coyote Creek, the Guadalupe River, and Guadalupe Creek. On the Guadalupe River, partial barriers at the Hillsdale Avenue crossing and downstream from the confluence of Ross Creek and the Guadalupe River have been removed. Vortex rock weirs were constructed in late 1998 that allow for upstream and downstream migration of salmonids. In November 1999, a step-pool fish ladder was constructed on the east bank of the Guadalupe River at the Alamitos drop structure downstream from Coleman Road. The ladder allows migrating salmonids to reach the upper watershed areas, including Alamitos Creek, Arroyo Calero, and Guadalupe Creek. Nine trees and 82 lf of SRA cover vegetation were affected by the project. Project impacts were mitigated directly upstream; the mitigation included planting 18 trees to create a minimum of 82 lf of SRA cover vegetation. Up to 0.17 acre of wetlands would be affected by the project. This wetland habitat is expected to recover naturally.

SCVWD is also constructing a fish ladder on Guadalupe Creek at Masson Dam, downstream from Camden Avenue. The ladder will allow migrating salmonids to reach the upper Guadalupe Creek watershed. The project will result in the loss of three cottonwood tree clusters and 17 lf of SRA cover vegetation. These impacts have been mitigated at the Guadalupe Creek Restoration Project – Phase 1 (see below). The trees were replaced at a 2:1 ratio and the SRA cover vegetation at a 1:1 ratio.

6.2.1.6 Guadalupe Creek Restoration Project

The Guadalupe Creek Restoration Project site is bordered upstream by Masson Dam, downstream by Almaden Expressway, to the north by residential development and the Los Capitancillos percolation pond system, and to the south by Coleman Road. SCVWD is proposing to establish an estimated 12,044 lf of SRA cover vegetation and improve aquatic habitat at this site to offset environmental impacts associated with future SCVWD projects. An EIR/EIS addressing the potential effects of the Guadalupe Creek Restoration Project is expected to be completed in 2001. The Guadalupe Creek Restoration Project is scheduled for implementation in 2001.

The banks of Guadalupe Creek are typically dominated by open ruderal habitat interspersed with stands of riparian forest and scrub or patches of coyote brush scrub and Himalayan blackberry bramble. The width of the riparian vegetation varies from the width of a single tree canopy to approximately 200 feet; some areas of the riverbank have no riparian vegetation. Patches of riverine wetlands are also found along the edges of the base-flow channel and along low-lying benches and bars below the creek's ordinary high water mark. Preproject riparian habitat totals approximately 10.10 acres. There are 1.23 acres of wetlands under the jurisdiction of the Corps and approximately 2,398 lf of SRA cover vegetation (Jones & Stokes, 1999b).

An estimated 0.51 acre of riparian vegetation would be affected by implementation of the mitigation plan. A total of approximately 1.0 acre of riparian habitat would be planted to mitigate for impacts. It is estimated that 833 lf of SRA cover vegetation would be affected by implementation of the mitigation plan and approximately 1,277 lf of SRA cover vegetation would be planted to mitigate for impacts. In 1998, approximately 1,246 lf of native riparian vegetation was planted in the Guadalupe Creek mitigation area. The affected SRA cover vegetation will be mitigated onsite at a 1:1 ratio.

The mitigation area design would affect approximately 0.94 acre of jurisdictional wetland habitat and some or all of the other waters of the United States. In-kind, instream wetland habitat mitigation may be possible during the early stages of riparian vegetation development; however, as the riparian vegetation matures, instream wetlands may be subjected to too much shade, and the vegetation may become sparser or may no longer be present. Long-term, in-kind instream mitigation is therefore not feasible. In-kind, offstream wetland mitigation may also be constructed within the mitigation area, or wetland mitigation may include construction of out-of-kind wetlands, such as riparian wetland, through the planting of riparian vegetation adjacent to the low-flow channel. The affected wetlands will be mitigated onsite at a 1:1 ratio.

The Guadalupe Creek Restoration Project site is a highly suitable site for providing mitigation for a variety of activities in the Guadalupe River watershed. The Guadalupe River Project with Bypass System Alternative proposes to use a portion of the Guadalupe Creek Restoration Project site to mitigate for impacts on SRA cover vegetation and aquatic habitat. SCVWD will manage and protect the mitigation site in perpetuity. The Guadalupe

Creek Restoration Project is independent of the Guadalupe River Project with Bypass System Alternative and will be implemented even if the Guadalupe River Project with Bypass System Alternative is not implemented.

6.2.1.7 Upper Guadalupe River Flood Control Project

The Upper Guadalupe River Flood Control Project (Upper Guadalupe River Project) is proposed by SCVWD to reduce the potential for flood damage along the upper Guadalupe River (Figure 6.1-1). The project includes channel modifications along eight reaches of the upper Guadalupe River. Proposed channel modifications include constructing bypass channels, widening the channel, adding benches, lining portions of the channel bank with gabions and cribwalls, and constructing floodwalls and levees. These modifications are designed to increase the capacity of the Guadalupe River. The project has a total length of approximately 6.4 miles and is divided into two discrete segments: one from Highway 101 to I-880 (Reach A) and another from I-280 to above Blossom Hill Road (Reaches 6 to 12). Modifications are also proposed on adjacent portions of two tributaries, Canoas Creek and Ross Creek. Construction of the Upper Guadalupe River Project is expected to take place over the 25-year period from 2000 through 2025. Expected flows from a flood protection project in the upper Guadalupe River were included in the modeling of the design floodflow for the Guadalupe River Project with Bypass System Alternative.

The Corps' 1985 Guadalupe River Interim Feasibility Report and EIS (U.S. Army Corps of Engineers, 1985; Section 1.6.1, "Guadalupe River Interim Feasibility Report and Environmental Impact Statement (1985)), did not find economic justification for proposed channel modifications upstream from I-280. SCVWD, in the late 1980s, initiated an independent planning study for the Upper Guadalupe River Project. Planning and design of the Upper Guadalupe River Project continued concurrent with construction of Segments 1 and 2 of the Authorized Project. In 1997, SCVWD and the Regulatory Branch of the Corps, San Francisco District, prepared a draft EIR/EIS for the Upper Guadalupe River Project (Santa Clara Valley Water District and U.S. Army Corps of Engineers, 1997). A final EIR/EIS was issued in July 2000, which includes Volume IX, "Additional Information," for public review (Santa Clara Valley Water District and U.S. Army Corps of Engineers, 2000a).

The Upper Guadalupe River Project, as presently proposed, will affect approximately 10.45 acres of riparian vegetation, 4,886 lf of SRA cover vegetation, and 1.47 acres of wetlands. Other impacts of the Upper Guadalupe River Project include short-term elevations in stream water temperatures and a net decrease in the amount of in-channel armoring. Informal consultation with USFWS on this project was completed in 1997. No adverse impacts on listed terrestrial vertebrates or plants were identified.

Proposed channel modifications would result in beneficial impacts on stream ecology, hydrology, and fisheries. These include permanently fixing the concrete apron and weir at Hillsdale Avenue (Reach 10C) and a low-flow vehicle crossing downstream from Ross Creek (Reach 11B) to provide improved passage for fish (interim fixes were completed in November 1998). Both structures are potential barriers to upstream migration by adult salmon and steelhead. Only during peak urban storm runoff or prolonged watershed runoff are flows high enough to allow successful fish passage. Permanently fixing the interim structures would improve access for migrating fish from San Francisco Bay upstream to the drop structure above Blossom Hill Road. SCVWD would also move Stream Gage Station

No. 23B, a partial barrier to fish migration, from its location in the vicinity of Pearl Avenue Bridge downstream to the vicinity of the northbound Almaden Expressway bridge (Reach 10B). The new stream gage will be constructed so that it will not be a barrier to fish migration. Stepped pools would be constructed at the Ross Creek confluence and at the Alamitos drop structure upstream from Blossom Hill Road. SCVWD would also improve fish passage conditions on Guadalupe Creek at Stream Gage Station No. 43 and at a concrete channel stream reach midway between the confluence of Pheasant Creek with Guadalupe Creek and Reynolds Road to provide access for migrating fish to an additional 1.3 miles of stream habitat upstream from Mason Dam. In addition, SCVWD proposes to provide for fish passage at the gabion structure on Alamitos Creek upstream from Mazzone Drive and at Stream Gage Station No. 16 on Alamitos Creek. These improvements would provide access for migratory fish to approximately 10.9 miles of upstream fish habitat. Vortex rock weirs would be constructed between Willow Glen Way and Branham Lane (Reaches 9, 10, and 11) to provide instream cover and deepen the feeding areas for fish in the riffle reach of the channel. The weirs would act as a grade-control structure and prevent upstream lateral migration, bank erosion, and aggradation. They would also maintain a low width-to-depth ratio, which would reduce the likelihood of sand or gravel bar deposition and maintain the sediment transport capacity of the stream. The project would remove approximately 5,930 lf (134,400 sf) of rubble in the construction area. Approximately 3,375 lf (0.6 bank mile; 84,300 sf) would become natural bank. The Upper Guadalupe River Project is also expected to reduce the frequency and quantity of bank erosion, thereby improving water quality. The proposed riparian mitigation (Table 6.2-1) would also provide for a more continuous riparian corridor along the upper Guadalupe River by reducing the number and lengths of gaps in riparian vegetation.

Table 6.2-1 summarizes proposed SRA cover vegetation and riparian habitat mitigation for both the Guadalupe River Project with Bypass System Alternative and the Upper Guadalupe River Project; none of the proposed mitigation for the Upper Guadalupe River Project is included as mitigation for the Guadalupe River Project with Bypass System Alternative. After completion of the Upper Guadalupe River Project, the Guadalupe River immediately upstream from I-280 will have a channel capacity of 14,600 cfs, which is equal to the peak discharge for the design floodflow on the Guadalupe River upstream from Los Gatos Creek (Section 6.2.2, "Cumulative Impacts on Hydrologic and Hydraulic Conditions"). Hydrologic modeling for the Guadalupe River Project with Bypass System Alternative incorporated the upstream floodflows expected to result from completion of the Upper Guadalupe River Project.

6.2.1.8 Lower Guadalupe River Flood Protection Project

The proposed Lower Guadalupe River Flood Protection Project (Lower Guadalupe River Project) includes flood protection measures on the Guadalupe River between I-880 and the Alviso UPRR Bridge and downstream from the Alviso UPRR Bridge in Alviso Slough (Figure 6.1-1). The entire length of this project has earthen levees on both banks.

In 1985, during the planning and design of the Guadalupe River Project, it was understood, based on the best available information, that the lower Guadalupe River had adequate capacity to safely convey the 100-year design floodflow of 17,000 cfs (U.S. Army Corps of Engineers, 1985). No adverse impacts on lower Guadalupe River hydrologic or hydraulic

TABLE 6.2-1. SRA Cover and Riparian Habitat Mitigation for the Guadalupe River Project with Bypass System Alternative and the Upper Guadalupe River Project

This table itemizes the linear feet of SRA cover mitigation and acres of riparian habitat mitigation for the Guadalupe River Project with Bypass System Alternative and the Upper Guadalupe River Project. The purpose of the table is to demonstrate that there is no mitigation overlap between the two projects.

Mitigation Site	Guadalupe River Project SRA (lf)[a]	Guadalupe River Project Riparian (ac)	Upper Project SRA (lf)	Upper Project Riparian (ac)
Segments 1, 2, and 3	2,534	21.0	–	–
Bypass Reach (Woz Way)	410	–	–	–
Reach A (airport reach)	7,848	–	–	–
Reach 6–10A	–	–	3,650	7.61
Reach 10B	–	–	2,180	2.52
Reach 10C–11	–	–	6,543	8.29
Reach 12	–	–	975	6.70
Reach 13	–	–	–	1.29
Guadalupe Creek	12,044	–	–	–
Barrier Removal – Guadalupe River	–	–	Provide permanent fish passage	–
Barrier Removal – Upper Guadalupe Creek	–	–	Provide permanent fish passage	–
Cumulative: Barrier Removal – Alamitos Creek	–	–	Provide permanent fish passage	–
Total of Potential Mitigation	22,836	21.0	13,348	26.41
Needed	18,026[b]	21.0	4,886	20.89

[a] Assumes implementation of Bypass System Alternative.

[b] Total need for mitigation is based on HEP Analysis. Excess SRA cover vegetation mitigation credits on Guadalupe Creek would be used by SCVWD to mitigate for other projects.

– = No mitigation for this project in this reach.

conditions were expected as a result of the Guadalupe River Project. In a 1991 agreement with the Corps, SCVWD certified that the lower Guadalupe River had the capacity to safely convey the 100-year design floodflow.

After the January and March 1995 storm events on the Guadalupe River, SCVWD initiated studies to re-assess the conveyance capacity of the lower Guadalupe River. In 1998, SCVWD completed the analysis and concluded that the lower Guadalupe River below I-880 does not have sufficient capacity to convey the 100-year design floodflow of 17,000 cfs. From Trimble

Road downstream to the town of Alviso, channel capacity has been reduced by approximately 40 percent, primarily because of sediment deposition. In addition, the hydraulic modeling of the lower Guadalupe River used in the analysis assumed that vegetation in the river is mature, which results in an increase in channel roughness. This assumption decreased the modeled capacity of the lower Guadalupe River.

SCVWD is currently developing the Lower Guadalupe River Project to restore the channel capacity between I-880 and the Alviso UPRR Bridge and to identify alternatives for conveying floodflows downstream from the Alviso UPRR Bridge (Figure 6.1-1). The Lower Guadalupe River Project would be implemented by SCVWD to restore the channel capacity guaranteed in SCVWD's 1991 agreement with the Corps. The Lower Guadalupe River Project will provide channel capacity to convey flows from the Guadalupe River Project with Bypass System Alternative and the Upper Guadalupe River Project.

In 1998, the Corps, SCVWD, and the resource agencies (USFWS, NMFS, CDFG, and the San Francisco Bay RWQCB) agreed through a collaborative process, described in Chapter 7, to modify the Guadalupe River Project by using a bypass to avoid impacts on environmental resources. The collaborative discussed whether it was appropriate to proceed with the Guadalupe River Project in light of the new information on the decreased capacity of the lower Guadalupe River. The resource agencies allowed the Guadalupe River Project to remain a separate project on schedule for completion in 2004. Completion of the Lower Guadalupe River Project is scheduled for 2002. The cumulative impact analysis contained in this Report includes an analysis of the Upper and Lower Guadalupe River Projects and the Guadalupe River Project with Bypass System Alternative to assist in a full understanding of the projects and their related flood protection components.

The Lower Guadalupe River Project EIR/EIS will address a full range of alternatives for flood protection downstream from I-880 and for conveying floodflows downstream from Alviso. The alternatives will be designed to contain the increased flows that would result from the operation of the Guadalupe River Project with Bypass System Alternative and the Upper Guadalupe River Project and to minimize or avoid impacts on environmental resources in the Guadalupe River watershed, including listed species and their habitat. Flood protection elements could include raising existing levees, setting levees farther back from the river, constructing offstream storage, constructing flood bypasses, dredging the channel, or a combination of some or all of these elements. The Lower Guadalupe River Project EIR/EIS will address the potential direct, indirect, and cumulative impacts of each alternative on natural resources in the Guadalupe River watershed, including the Alviso Slough area. SCVWD will consult with USFWS's Endangered Species Division regarding the potential hydrologic and hydraulic impacts of the Lower Guadalupe River Project. If an impact is identified, appropriate mitigation measures will be included in the EIR/EIS and BA for the Lower Guadalupe River Project, and SCVWD will prepare an MMP for the Lower Guadalupe River Project for review and approval by the Endangered Species Division. Included in the alternatives screening and impact analyses will be the assessment of the potential effect of alternatives on public access to existing and future trails along the Guadalupe River corridor as well as potential effects on the Alviso Marina County Park.

The EIR/EIS and BA for the Lower Guadalupe River Project will also address the cumulative impacts of all projects in the Guadalupe River watershed that would affect the river's resources. The analysis of cumulative impacts will include, but not be limited to, the

Guadalupe River Project with Bypass System Alternative, the Upper Guadalupe River Project, and the Lower Guadalupe River Project. Construction of the Upper Guadalupe River Project and the Guadalupe River Project with Bypass System Alternative would not foreclose or limit options to develop appropriate mitigation for cumulative impacts determined in the Lower Guadalupe River Project EIR/EIS.

The Lower Guadalupe River Project EIR/EIS will identify alternatives and evaluate the potential impacts of each alternative. To estimate potential impacts of the Lower Guadalupe River Project for this cumulative impact analysis, two alternatives for the Lower Guadalupe River Project that encompass the potential range of impacts of the project have been considered. One alternative would restore the original design capacity by removing sediment from the entire channel between Highway 101 and the Alviso UPRR Bridge. This alternative focuses on instream modifications and represents an alternative at the upper range of expected impacts. This alternative could result in the temporary removal of approximately 65 acres of wetlands and affect an estimated 30 acres of other waters of the United States. An estimated 2.5 acres of riparian habitat, including SRA cover vegetation, could be removed, primarily downstream from Montague Expressway. Most of the temporary impacts on wetlands would be self-mitigating because the wetlands would be likely to reestablish. However, the types of species in the wetlands and their distribution may be different. It may also take several seasons for wetlands to reestablish throughout the channel. The significance of this change has not been evaluated nor have all potential mitigation options. However, impacts on riparian habitat will be mitigated.

An alternative at the lower range of expected impacts would avoid instream work. Such an alternative could include flood bypasses, raising levees, setting back levees, constructing offstream storage, or some combination of these techniques. This alternative would avoid impacts on wetlands and SRA cover vegetation and minimize impacts on riparian habitat, aquatic resources, water quality, and aesthetic resources. It is likely that the selected project alternative ultimately will be a combination of many options, such as instream and out-of-channel structural modifications and modifications to operations and maintenance practices. Between the Alviso UPRR Bridge and the confluence of Alviso Slough with Coyote Creek and San Francisco Bay, potential modifications include raising existing levees, building new floodwalls, setting levees farther back from the slough, establishing a floodplain terrace, or a combination of these alternatives.

This cumulative impact analysis assumes that a combination of instream and out-of-channel structural modifications will be implemented between Highway 101 and the Alviso UPRR Bridge as part of the Lower Guadalupe River Project. The analysis assumes that a combination of floodwalls/levees and a floodplain terrace will be implemented downstream from the Alviso UPRR Bridge in the Alviso Slough area.

The lower Guadalupe River between the I-880 bridge and the Highway 101 bridge currently has a channel capacity of approximately 17,000 cfs. Between the Highway 101 bridge and the Highway 237 bridge, the channel capacity is limited to approximately 14,000 cfs. The channel capacity between the Highway 101 bridge and the Highway 237 bridge serves to limit the peak floodflows that can be conveyed in the lower Guadalupe River. Under existing conditions, flows greater than 14,000 cfs break out of the channel along the lower Guadalupe River upstream from the Highway 237 bridge. Downstream from the Highway 237 bridge, floodflows in the Guadalupe River are limited to 14,000 cfs. Floodflows overtop the west levee into adjacent salt evaporation ponds just downstream from the Alviso UPRR Bridge. When flows reach 14,000 cfs at the Alviso UPRR Bridge, approximately 5,500 cfs flows into the salt evaporation ponds. Floodflows are limited to approximately 8,500 cfs in Alviso Slough. The existing channel capacity of the lower Guadalupe River at the Highway 237 bridge will remain at approximately 14,000 cfs until the Lower Guadalupe River Project has been completed. In addition, the lower Guadalupe River/Alviso Slough area will not experience a change in floodflow frequency, duration, or magnitude from existing conditions because the channel capacities in the lower Guadalupe River/Alviso Slough area will remain the same until the Lower Guadalupe River Project has been completed. With completion of the Lower Guadalupe River Project, the flows at the Highway 237 bridge during the 100-year design flood event would be expected to range from 17,000 to 20,000 cfs, depending on the amount of floodwater pumped into the lower Guadalupe River from adjacent storm drains (Section 6.2.1.9, "Stormwater Pump Installations").

Because of the reduced capacity of the lower Guadalupe River, the potential for flooding between I-880 and the Alviso UPRR Bridge would increase if the Guadalupe River Project with Bypass System Alternative were to be operated without the flood protection provided by a flood protection project in the lower Guadalupe River. Therefore, the entire Guadalupe River Project with Bypass System Alternative would not be made operational until the Lower Guadalupe River Project has been completed. As described in Section 3.4.4, "Operation and Maintenance," all bypasses will remain closed with bulkheads and the flood training walls in Segment 3C will remain unfinished until the Lower Guadalupe River Project is operational. Therefore, any potential cumulative effects of the Guadalupe River Project with Bypass System Alternative will not occur until the Lower Guadalupe River Project is operational.

6.2.1.9 Stormwater Pump Installations

The cities of San Jose and Santa Clara and Caltrans have installed or will install stormwater pumps with outlets in the vicinity of or downstream from Highway 101. It is estimated that the stormwater pumps would contribute up to 3,000 cfs to the Guadalupe River during rainfall events. The proposed new stormwater discharge facilities would be designed and operated to ensure that the discharges comply with State water quality objectives. The SCVURPP is a coalition of 15 local agencies that are co-permittees for the NPDES permit for municipal stormwater drainage systems in the Santa Clara Valley. The NPDES permit requires that member agencies reduce the discharge of pollutants to the maximum extent practicable. Measures used by the SCVURPP to minimize or prevent pollutant discharges include management practices, control techniques, system design, engineering methods, and other means appropriate for the control of such pollutants. The goal of the NPDES permit is to ensure that stormwater discharges do not violate State water quality objectives or impair beneficial uses of the receiving waters.

The operation of the stormwater pumps is likely to require an amendment to SCVURPP's NPDES permit and associated waste discharge requirements to include the new points of discharge. Other provisions may be required for the new discharges, including a specific design for trash removal at the pump stations, use of oil-water separators, sediment control structures, and long-term annual monitoring of wet-weather discharges to evaluate performance and compliance with permit conditions.

6.2.1.10 Virginia Street Bank Stabilization Project

SCVWD Virginia Street bank stabilization project, completed in 1997, involved stabilizing and protecting approximately 150 feet of eroded bank along the eastern side of the Guadalupe River, downstream from Virginia Street. The site is located upstream from Segment 3C of the Guadalupe River Project in a residential neighborhood. The purpose of the project was to stabilize the streambank, preventing further erosion and undermining of the adjacent roadway, McClellan Avenue. The work consisted of repairing the failing bank and placing approximately 240 cubic yards of soil and 280 cubic yards of rock riprap slope protection along the bank. Voids in the rock riprap were filled with soil and planted with live cuttings of native species. In order to accomplish the proposed work, a temporary dirt access road was constructed, and the site was dewatered prior to construction. No impacts on riparian vegetation or jurisdictional wetlands occurred with the project. After high floodflows in 1998, the area was repaired under emergency conditions. (Reiller, pers. comm.).

6.2.1.11 Santa Clara Valley Water District Stream Maintenance Program

SCVWD Stream Maintenance Program will provide long-term guidance to SCVWD to effectively implement routine stream maintenance projects in a cost-effective and environmentally sensitive manner. The Stream Maintenance Program report (Santa Clara Valley Water District, 2000), issued in August 2000, is a process and policy document that will be adopted by SCVWD and used in obtaining long-term permits for routine stream maintenance activities. The Stream Maintenance Program addresses all routine stream maintenance activities, such as sediment removal, vegetation management, and bank protection, within SCVWD's jurisdiction. Approximately 829 miles of streams and 41 miles of canals are under SCVWD's jurisdiction in the Santa Clara Basin and the Pajaro River Basin. The Stream Maintenance Program report documents the results of extensive collaboration with Stream Maintenance Program external stakeholders. A Program EIR for the Stream Maintenance Program is expected to be issued in 2001. SCVWD Stream Maintenance Program is not yet an approved program, and it will not be implemented until after the Program EIR and a Endangered Species Act compliance have been completed and all necessary permits obtained.

The Stream Maintenance Program report estimates that proposed future sediment removal and vegetation management activities could affect approximately 76 acres of riparian vegetation (including native and nonnative species), 100 acres of nontidal wetlands, and 30 acres of tidal wetlands. Proposed mitigation for potential adverse environmental effects associated with the Stream Maintenance Program has three components: (1) policies, implementation measures, and BMPs organized by type of activity and designed to avoid and minimize impacts; (2) compensatory mitigation through restoration and preservation; and (3) mitigation for potential impacts on sensitive species. A proposed compensatory mitigation package for significant residual impacts of the Stream Maintenance Program includes: (1) watershed and habitat protection through preservation of existing high-quality habitat, primarily in upper watershed areas; (2) restoration of riparian habitat through exotic pest plant removal and riparian re-vegetation, primarily in mid-watershed areas; (3) restoration and protection of tidal wetlands in the lower watershed, and (4) creation of nontidal wetlands (Santa Clara Valley Water District, 2000).

6.2.1.12 Alviso Ring Levee Wetland Mitigation and Restoration Project

The Alviso Ring Levee Wetland Mitigation and Restoration Project, conducted by the City of San Jose Public Works Department, is located near the community of Alviso along the southern edge of the South San Francisco Bay, adjacent to the New Chicago Marsh and between Alviso Slough and Artesian Slough. The project, completed in 1997, involves the creation of 6.93 acres of seasonal wetlands on three sites and the restoration of 3.14 acres of former wetlands on four sites. The objective of the mitigation and restoration project was to create seasonal wetlands to replace the functions, values, and losses over time of the 3.14 acres of seasonal wetlands covered by the placement of the ring levee. Construction activities included removing illegal fill and debris as necessary, removing a levee at the largest of the mitigation sites to allow introduction of water from an adjacent salt marsh, grading and filling to achieve ground elevations appropriate for establishment of marsh habitat, and planting with native seeds and root cuttings to establish desired vegetation. (Lee, pers. comm.)

6.2.1.13 Almaden Quicksilver County Park Project

The Almaden Quicksilver County Park, located between Alamitos and Guadalupe Creeks, is a 3,984-acre undeveloped park southeast of Los Gatos on the northeast ridge of the Santa Cruz Mountains. The park supports limited public use, primarily horseback riding and hiking. The Santa Clara County Parks and Recreation Department purchased most of the park in 1973 and 1975, and there was an additional purchase in 1993. A Trails Master Plan was completed in 1998 (County of Santa Clara, 1998b) and is being implemented. The Trails Master Plan includes improvements to approximately 30 miles of existing trails and construction or realignment of approximately 2 miles of trails. No impacts on riparian vegetation or wetlands are expected with the project (County of Santa Clara, 1998a, Mark, pers. comm.).

The park is Santa Clara County's second largest park and has been designated as a historical park. Much of the park's historical significance stems from cinnabar (mercury sulfide) mining from the mid-1800s until 1976. Historical mining activities in some parts of the park have resulted in elevated concentrations of mercury in mine waste materials. Hazardous waste clean up activities at the Almaden Quicksilver County Park have been actively pursued by the DTSC. Five "hot spots" required remediation: the Hacienda Furnace Yard, the Mine Hill area, the Enriquita Mine Retort, the San Mateo Mine Retort, and the Senador Mine Retort. DTSC announced its certification of the Almaden Quicksilver County Park in February 2000. Certification indicates that all appropriate onsite removal and remedial actions have been completed. Remedial work included site containment and stabilization through placement of vegetated soil covers and streambank stabilization. However, mercury from the mines has migrated down the watershed; cleanup activities were limited to the mine site.

6.2.1.14 Boston Property Project

The proposed Boston Property Project involves construction of three 19-story office buildings containing office space and parking as well as outdoor café areas on a 3.7-acre site in downtown San Jose, west of the convention center between Woz Way and San Carlos Street and between the Guadalupe River and Almaden Boulevard. The three-phase Class A office development totals 863,186 rentable sf and approximately 2,170 parking spaces. There would be six levels of parking above grade and 3 levels below grade for each building. Building 1, which would be located at the southern end of the site, would be approximately 277 feet high and include 349,260 gross sf of office space and 360,231 sf of parking (893 spaces). Building 2, which would be located in the middle of the site, would be approximately 256 feet high and include approximately 371,749 gross sf of office space and 212,721 sf of parking (614 spaces). Building 3, which would be located at the north end of the project site, would be approximately 230 feet high and include approximately 320,713 gross sf of office space and 255,765 sf of parking (663 spaces). (Burton, pers. comm.).

An addendum to the Downtown Strategic Plan Programmatic EIR that addresses the proposed Boston Property Project is expected to be completed in late 2000. The proposed buildings would be set back from the edge of the existing riparian corridor and riverwalk trail along the Guadalupe River by as much as 70 feet in some areas and 5 to 25 feet in other areas. The café elements would be 0 to 15 feet from the riparian corridor. The project would likely result in increased human disturbance of the riparian corridor. The buildings, depending on their design and lighting, could result in an increase in bird injury or death caused by collisions with windows. The proposed project could result in decreased value of the adjacent riparian corridor to wildlife, particularly birds. (Stephens, pers. comm.).

6.2.1.15 John P. McEnery Park Site Improvements

The John P. McEnery Park is located immediately east of the Guadalupe River on the south side of San Fernando Street and 310 feet west of Almaden Boulevard. The San Jose Redevelopment Agency's improvement project at the park involves redesigning and renovating the park for families and children. The existing tennis courts are being removed and replaced with a water fountain and water channel play area, restrooms, picnic tables, and children's play equipment and lawn. No impacts on riparian vegetation or wetlands will occur with the project. The central element of the park is the fountain and water channel, which serve both to educate visitors about the natural history of rivers and provide water play opportunities for children. The improvements are currently under construction and are expected to be completed in December 2000.

6.2.1.16 Los Gatos Creek Trail Project, Phase IIA.A

The City of San Jose's Los Gatos Creek Trail Project, Phase IIA.A, was completed in 1998. The project included construction of approximately 3,500 lf of trail between Willow Street and Meridian Avenue and installation of a prefabricated arched pedestrian/bicycle bridge that spans Los Gatos Creek immediately downstream from Leigh Avenue Bridge. The trail will be constructed along the top-of-bank of Los Gatos Creek; the majority of the trail will be on existing maintenance roads. A total of 0.25 acre of riparian vegetation was affected, and 0.62 acre of riparian vegetation was planted as mitigation. No impacts on wetlands occurred.

6.2.1.17 Vasona Light Rail Extension

The Vasona Light Rail Extension project is the construction and operation of an extension of the existing Light Rail Transit System in Santa Clara County. The Lead Agency for the project is the Santa Clara Valley Transit Authority. The project would provide light rail transit service to the Vasona Corridor, which extends approximately 11 miles from downtown San Jose, beginning at the intersection of West San Carlos Street and Woz Way, to Los Gatos. The project would provide a direct connection to existing commuter rail service and the San Jose Arena. Impacts of the proposed project were evaluated in a joint EIS/EIR, which indicated that the project would result in significant adverse impacts on public safety, noise, land use, vegetation and wildlife and water quality. Impacts on public safety and noise would occur as a result of operation of the light rail extension. Construction of the project would impact 0.41 acres of wetlands, 0.23 acres of riparian habitat, and up to 187 mature trees. Water quality in Los Gatos Creek could be affected during construction. The EIS/EIR indicated that all significant adverse impacts would be reduced to a less than significant level by implementing appropriate mitigation measures.

6.2.1.18 CORE Location Project

The CORE Location Project is a development project in downtown San Jose. The project site is bounded by the UPRR No 4 track on the south and west, the UPRR rail yard on the north and the Guadalupe River riparian corridor on the east. The project site consists of existing warehouses, storage areas, parking lots, and loading zones. An existing buffer zone ranging from 35 to 105 feet separates the existing warehouses from the riparian corridor. The buffer zone is bare soil. The planned project is to demolish the existing structures and construct two buildings that will house data facilities. The buildings will be two stories tall and have a combined size of 400,000 sf.

An assessment of the biotic resources of the project site and potential impacts on the riparian corridor was conducted in October 2000. The assessment indicated that vegetation within the proposed construction areas are limited to scattered small trees and shrubs. The assessment concluded that construction of the proposed buildings would not directly affect the Guadalupe River riparian corridor because the buildings would be located outside of the required 100-foot wide riparian setback. Temporary impacts on wildlife associated with the riparian corridor may occur as a result of noise and other disturbances during construction.

6.2.1.19 Related Projects in the Guadalupe River Watershed

Additional projects, described below, are under consideration for implementation in the Guadalupe River watershed. Quantitative impacts of these projects are not known at this time because the projects are not yet fully defined. However, it is important to understand the relationship between these projects and the Guadalupe River Project with Bypass System Alternative.

Automated People Mover at San Jose International Airport. An automated people mover, possibly like a monorail, is proposed to be constructed to connect the airport with the light rail station on North First Street. Two potential Guadalupe River crossings are under consideration, one approximately 800 feet downstream from the proposed two-lane access bridge to the rental car garage and another between Skyport Bridge and Airport Parkway. Construction is planned for 2002 to 2007. Environmental compliance has not been initiated for the project, but impacts are expected to be minimal because the people mover will be narrow and elevated (Hessler, pers. comm.).

Santa Clara Valley Water District Instream Recharge Program. SCVWD Instream Recharge Program involves the placement of instream spreader dams to percolate surface water into the channel and thereby replenish the groundwater basin. The Instream Recharge Program consisted of 50 project sites distributed throughout Santa Clara County. On the Guadalupe

River system, sites are located on Guadalupe Creek, the upper Guadalupe River, and Los Gatos Creek. The CWA Section 404 permit that governed SCVWD's use of gravel dams for instream recharge expired in 1994, and the San Francisco Bay RWQCB indicated to SCVWD that CEQA compliance would be required before new permits could be issued. In March 1995, SCVWD released a draft EIR for a proposed Instream Recharge Program that would continue activities associated with the installation and operation of as many as 44 spreader dams providing 34,000 af of artificial groundwater recharge annually, or 23 percent of SCVWD's artificial recharge capacity. The Instream Recharge Program is currently under review by SCVWD. The program that will be proposed as a result of this reconsideration is not known at this time. However, SCVWD has committed to cease operation of instream spreader dams in Guadalupe Creek.

City of San Jose Riparian Corridor Policy Study. The City of San Jose Riparian Corridor Policy Study provides policy and development guidelines for riparian areas along all creeks in the City of San Jose and could therefore affect the Guadalupe River watershed. The study defines the riparian corridor and provides development guidelines for setbacks, access control, landscaping, lighting, and compatible land uses. The City is reviewing the Riparian Corridor Policy Study and may propose its adoption in the future. Adoption and implementation of riparian corridor development guidelines could help to reduce the severity of cumulative impacts in the Guadalupe River watershed.

Fisheries and Aquatic Habitat Collaborative Effort (FAHCE). The Guadalupe River, Coyote Creek, and Stevens Creek provide habitat for a variety of aquatic resources, including fall-run chinook salmon and steelhead. Many activities, including water management, urban encroachment, land uses, agricultural use, reclamation, flood protection, and water supply operations by SCVWD, cause concern for the condition of the public trust resources and the quality and availability of instream habitat in the river and creeks. These activities also raise concern about the economic and social impacts of efforts to significantly alter the existing flow regimes of the river and creeks. SCVWD has been named in a complaint filed before the SWRCB for violations of the California Fish and Game Code, the California Water Code, and Public Trust Doctrine related to SCVWD's incremental contribution to the cumulative impacts on chinook salmon and steelhead and their habitat within the river and creeks. The complaint alleges harm to cold water fisheries as a result of consumptive urban and agricultural water uses in Santa Clara County. To address this complaint, the Fisheries and Aquatic Habitat Collaborative Effort (FAHCE) has been initiated jointly by SCVWD and CDFG.

The FAHCE will identify factors limiting steelhead and chinook salmon populations in the Guadalupe River, Coyote Creek, and Stevens Creek watersheds. Both flow and nonflow measures will be considered by the FAHCE when addressing the complaint. Participants include SCVWD; CDFG; Guadalupe-Coyote Resource Conservation District, Pacific Coast Federation of Fishermen's Associations, and Trout Unlimited, as represented by NHI; NMFS; USFWS; and the City. The FAHCE study is expected to be completed in 2001.

Santa Clara Valley Water District Multiple Species Habitat Conservation Plan. SCVWD, in cooperation with USFWS, NMFS, and CDFG, is preparing a Multiple Species Habitat Conservation Plan (MSHCP). The MSHCP addresses SCVWD's activities and responsibilities under the ESA, as amended (16 USC 1531-1544). The MSHCP is expected to be completed in 2001. In preparing the MSHCP, SCVWD is requesting an incidental take permit under Section 10(a) of the ESA to conduct flood protection, water supply, and related activities within SCVWD's operational area. The MSHCP addresses projects, activities, and the process SCVWD will use to evaluate the potential for take of covered species. The MSHCP, including the conservation measures, applies only to SCVWD and its activities. The Guadalupe River is not included in the MSHCP because of the ongoing coordination with USFWS, NMFS, and CDFG regarding projects on the river. Because SCVWD does not regulate land uses in Santa Clara County, the MSHCP does not cover individuals or other agencies in Santa Clara County.

Guadalupe Fisheries Management Plan. The expected goal of SCVWD's Guadalupe Fisheries Management Plan is to develop a comprehensive management plan to preserve, protect, and enhance the fishery and aquatic resources of the Guadalupe River and those tributaries capable of supporting or contributing to these resources. SCVWD intends to prepare and implement the Guadalupe Fisheries Management Plan in the near future.

The expected objectives of the plan are to:

- Provide guidance for fisheries habitat protection and restoration in the Guadalupe River watershed
- Identify actions SCVWD can take to maintain and improve existing habitat for native fish
- Facilitate communication with stakeholders, including environmental organizations, the public, and regulatory/resource agencies
- Provide a focus for SCVWD's BMPs, program and project coordination, and budgeting for the Guadalupe River watershed
- Provide a coordinated effort to protect and mitigate impacts on fishery resources associated with construction projects, operations, and maintenance tasks
- Encourage innovative solutions for improving aquatic habitat
- Act as a catalyst for native fish enhancement efforts in South Bay streams

Los Capitancillos Freshwater Wetland Mitigation Site Development Project. The Los Capitancillos Freshwater Wetland Mitigation Site Development Project is proposed on SCVWD-owned property adjacent to the Guadalupe Creek Restoration Project site near Masson Dam. SCVWD is proposing to implement a wetland mitigation project that would include the construction of a 5-acre seasonal freshwater wetland. The wetland will provide habitat for common seasonal freshwater plants and associated vertebrate and invertebrate species. SCVWD-owned parcel is currently a relatively flat, open, weedy field. The schematic design phase of the project is scheduled to be completed by fall 2000. The engineers' report and the environmental documents for this project are scheduled to be completed by fall 2001.

The preliminary design concept for the project consists of a series of interconnected wetland basins, including an upland sedimentation area. Water will flow into the southwest end of the wetland from SCVWD's Almaden Valley pipeline. No surface water from the wetland mitigation site will flow into Guadalupe Creek under the existing conceptual plan. Because the site is located in a residential area, it is anticipated that the final design will include passive recreational features, such as a pedestrian walkway, wildlife viewing areas, and interpretive signs, as well as vegetation barriers or fences.

San Jose Downtown Strategy Plan. In 1992, the City of San Jose prepared an EIR on the San Jose Downtown Strategy Plan and supplemented the original EIR in 1998. The EIR evaluates the impacts of implementing a plan for development of the central business district of San Jose. The study includes the central business district and adjacent area encompassing approximately 780 acres, including a portion of Guadalupe River Project. The focus of the EIR is on describing impacts on transportation and traffic, noise, public services, and cultural resources. The EIR does not quantify impacts on vegetation and wildlife, but indicates that impacts on these resources will be evaluated when specific projects are proposed. Because of the programmatic nature of the EIR and because specific projects are not discussed and effects are not quantified, information has not been incorporated into the cumulative impact analysis of this EIR/SEIS.

6.2.2 Cumulative Impacts on Hydrologic and Hydraulic Conditions

The following section focuses on the cumulative impacts of major projects in the Guadalupe River watershed on the hydraulic properties of the Guadalupe River under the prevailing hydrologic conditions. Section 4.1, "Hydrologic and Hydraulic Conditions," discusses the existing hydrology and hydraulic properties of the Guadalupe River watershed. The cumulative impacts discussed in this section are based on the qualitative and quantitative analysis of both the Guadalupe River Project with Bypass System Alternative and other major projects in the watershed. The principal reports containing data pertaining to hydraulic properties and hydrologic conditions include the 1977 Hydrology Study (U.S. Army Corps of Engineers, 1977), the 1991 GDM and 1993 revised GDM reports for the Guadalupe River Project (U.S. Army Corps of Engineers, 1991b), and the Upper Guadalupe River Watershed Study Engineers' Report (Santa Clara Valley Water District, 1997).

This section first describes the existing channel capacity of the Guadalupe River. This description provides a baseline from which to assess the cumulative impacts of major projects in the Guadalupe River watershed. The cumulative impacts of these projects on flood protection are then evaluated, followed by an assessment of the potential impacts on hydraulic properties and hydrologic conditions in the watershed.

6.2.2.1 Existing Channel Capacity of the Guadalupe River

The existing channel capacities in Los Gatos Creek and along the Guadalupe River in the downtown San Jose area and downstream from I-280 are depicted in Figure 6.2-1. Without the construction of the Upper Guadalupe River Project and the Guadalupe River Project with Bypass System Alternative, the capacity of the channel upstream from I-280 and upstream from Los Gatos Creek is limited to 9,100 cfs. Likewise, without the construction of the Guadalupe River Project with Bypass System Alternative, the capacity of the channel below the confluence with Los Gatos Creek at St. John Street is limited to 7,800 cfs. However, the projected 100-year peak flow upstream from I-280 is 14,600 cfs. Consequently, flows greater than 7,800 cfs would break out of the channel upstream from and in the vicinity of St. John Street during a 100-year peak flow event. Flows greater than 9,100 cfs would break out upstream and downstream from I-280 in the downtown San Jose area. Because the flood protection components of Segments 1 and 2 of the Authorized Project have been completed, the channel capacity at the downstream end of the project upstream from I-880 is 17,000 cfs. Depending on where and when flows that break out of the channel return to the Guadalupe River, flows at I-880 can be greater than 7,800 cfs under existing conditions. During the flood of 1995, flows at I-880 were estimated to reach 11,000 cfs.

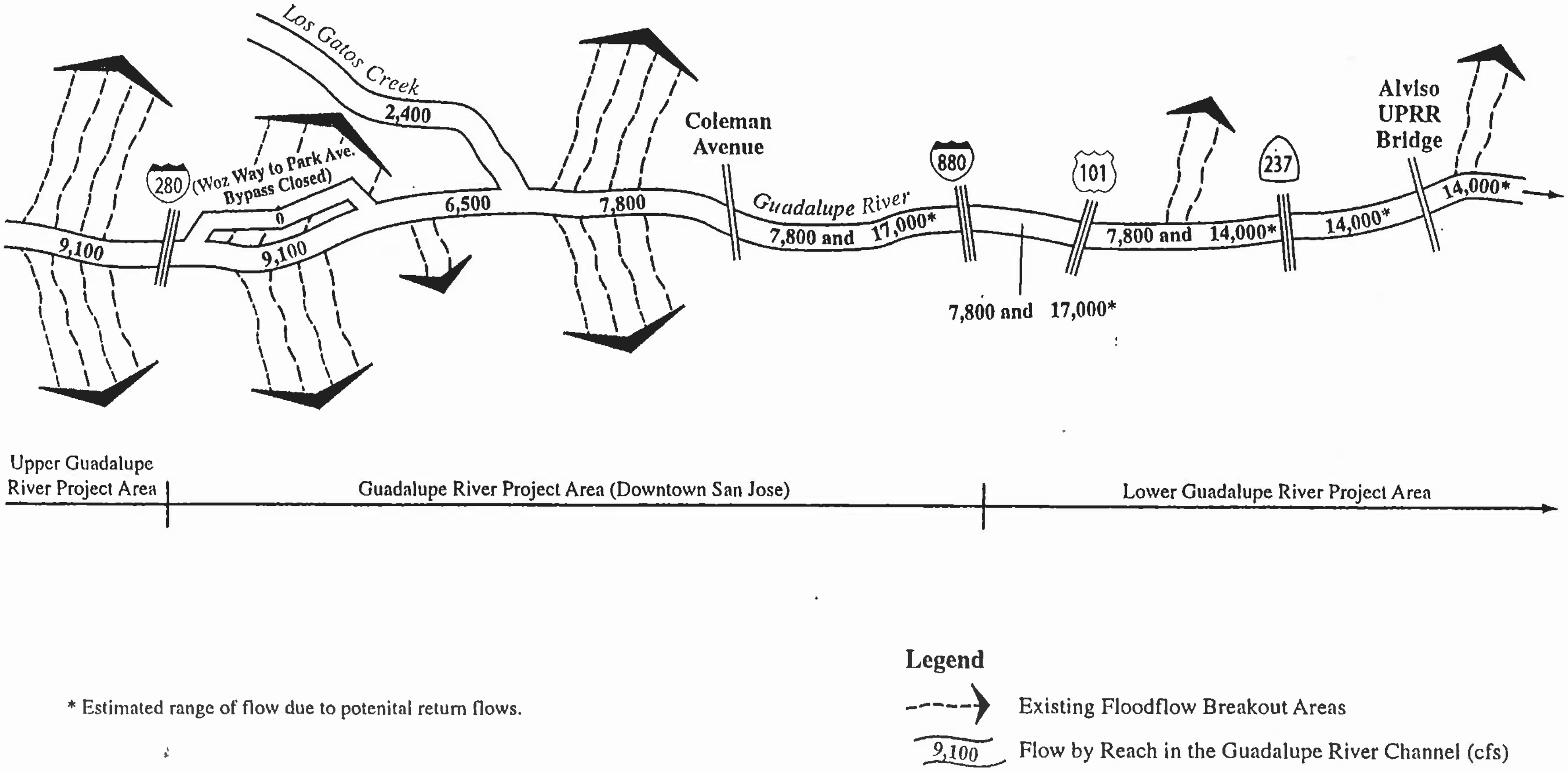
The lower Guadalupe River downstream from I-880 to Highway 101 has a capacity of 17,000 cfs. Between Highway 101 and the Highway 237 bridge, the river has a channel capacity of approximately 14,000 cfs (Figure 6.2-1). The channel capacity in this part of the river serves to limit the peak floodflows that can be conveyed in the lower Guadalupe River. Under existing conditions, flows greater than 14,000 cfs would break out of the channel along the lower Guadalupe River upstream from the Highway 237 bridge. In addition, if flows from the downtown area were to exceed 14,000 cfs, the existing channel capacity of approximately 14,000 cfs at the Highway 237 bridge would limit the floodflows in Alviso Slough to 14,000 cfs.

6.2.2.2 Flood Protection – Guadalupe River Watershed

Completion of the Upper Guadalupe River Project would result in flood protection for the 100–year design floodflow of 14,600 cfs upstream from I-280. The Guadalupe River Project with Bypass System Alternative has been designed to accommodate the 100-year design floodflow of 14,600 cfs on the Guadalupe River from I-280 to Los Gatos Creek. Downstream from the Guadalupe River's confluence with Los Gatos Creek, the Guadalupe River Project with Bypass System Alternative has been designed to accommodate the 100-year design floodflow of 17,000 cfs (Figure 6.2-2). As discussed in Section 6.2.1.8, "Lower Guadalupe River Flood Protection Project," the design of the downtown Guadalupe River Project with Proposed Action assumed a capacity of 17,000 cfs in the lower Guadalupe River between I-880 and San Francisco Bay.

Completion of the Upper Guadalupe River Project, the Guadalupe River Project with Bypass System Alternative, and the Lower Guadalupe River Project would provide for conveyance of the 100-year design floodflow. Figure 6.2-3 depicts the flows in the Guadalupe River channel at the peak of the design flood under cumulative conditions when all three flood protection projects are operational. With completion of the Upper and Lower Guadalupe River Projects and the Guadalupe River Project with Bypass System Alternative, flows at the Alviso UPRR Bridge are expected to be 17,000 to 20,000 cfs under the 100-year design floodflow.

The total floodflow rate downstream from Highway 101 with completion of the Upper and Lower Guadalupe River Projects and the Guadalupe River Project with Bypass System Alternative is not precisely known because it is anticipated that some of the additional channel capacity would be used for conveyance of local stormwater. Up to 3,000 cfs of local stormwater could be pumped from lands adjacent to the Guadalupe River in the area between Highway 101 and the Alviso UPRR Bridge. The Lower Guadalupe River Project will be designed to convey up to 20,000 cfs to accommodate the potential stormwater pumping.

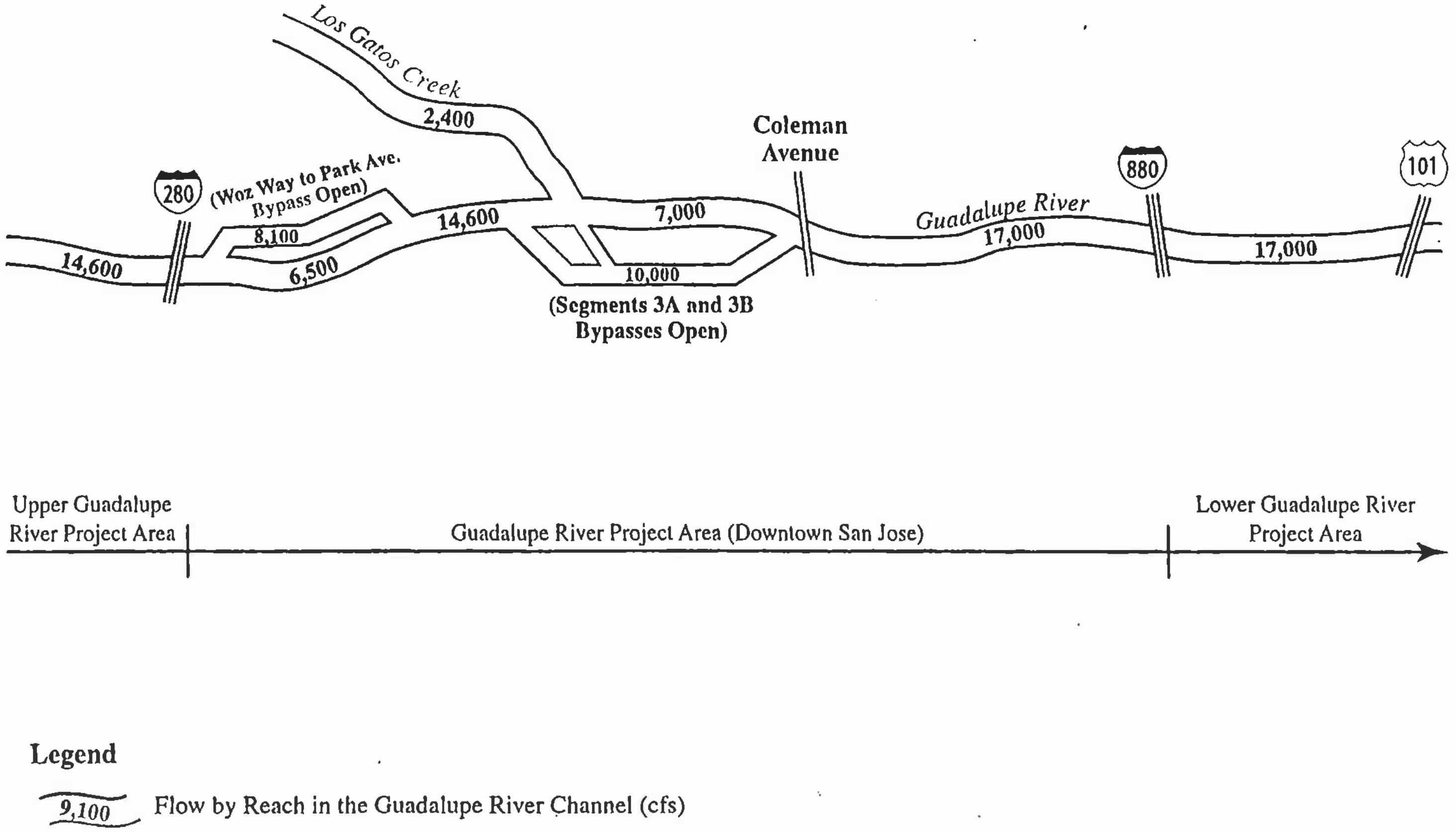

Los Gatos Creek
2,400
280
(Woz Way to Park Ave. Bypass Closed)
0
9,100
9,100
6,500
7,800
Coleman Avenue
Guadalupe River
7,800 and 17,000*
880
7,800 and 17,000*
101
7,800 and 14,000*
237
14,000*
Alviso UPRR Bridge
14,000*
Upper Guadalupe River Project Area
Guadalupe River Project Area (Downtown San Jose)
Lower Guadalupe River Project Area
Legend
Existing Floodflow Breakout Areas
9,100
Flow by Reach in the Guadalupe River Channel (cfs)

* Estimated range of flow due to potenital return flows.

Source: 100-year design floodflow is based on U.S. Army Corps of Engineers (1993).

Figure 6.2-1. Existing Flows in the Guadalupe River at the Peak of the 100-Year Design Floodflow

Existing conditions include completion of Segments 1 and 2 and Segment 3C Phase 1. The Woz Way to Park Avenue Bypass is closed. Floodflows break out upstream and downstream from I-280, downstream from Los Gatos Creek, downstream from Highway 101, and downstream from the Alviso UPRR Bridge.

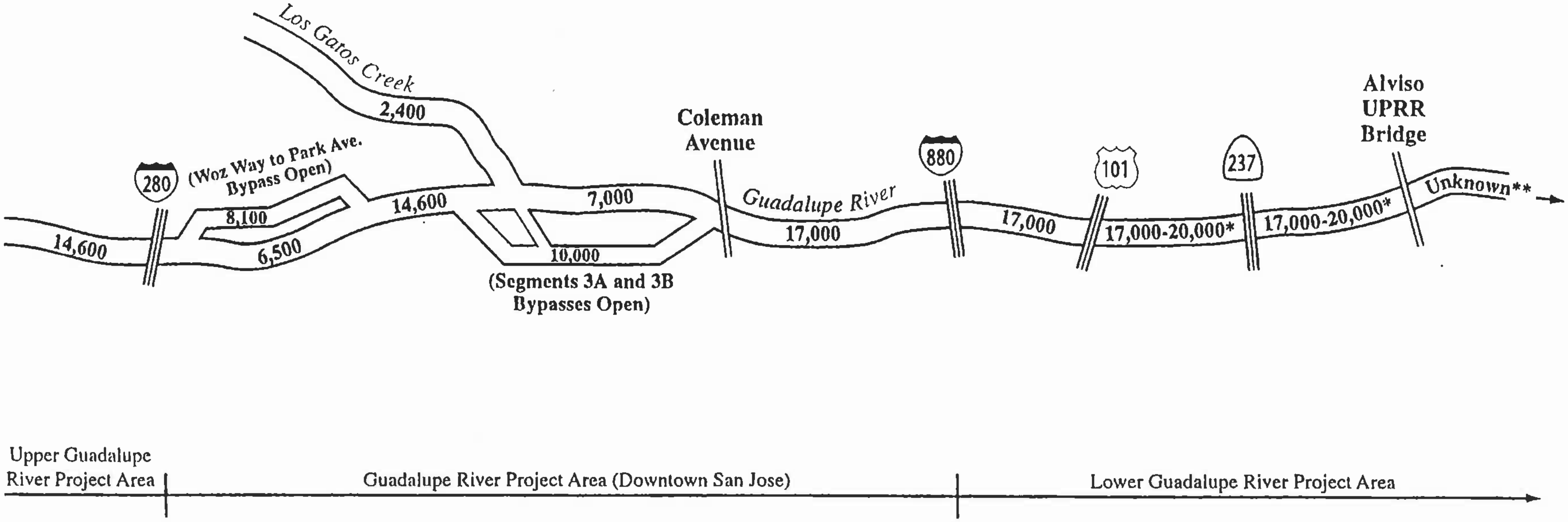


Source: 100-year design floodflow is based on U.S. Army Corps of Engineers (1993).

Revised

Figure 6.2-2. Flows in the Guadalupe River at the Peak of the 100-Year Design Floodflow for the Bypass System Alternative and Refined Bypass System Alternative

The Bypass System Alternative and Refined Bypass System Alternative include completion of Segment 3. Segments 1 and 2 are already completed. The Woz Way to Park Avenue Bypass is operational. The bypasses in Segments 3A and 3B are operational. With completion of the Bypass System Alternative or the Refined Bypass System Alternative and operation of the bypasses, floodflows remain in the Guadalupe River channel.


Los Gatos Creek
2,400
280
(Woz Way to Park Ave. Bypass Open)
8,100
6,500
14,600
14,600
7,000
10,000
(Segments 3A and 3B Bypasses Open)
Coleman Avenue
Guadalupe River
17,000
880
17,000
101
17,000-20,000*
237
17,000-20,000*
Alviso UPRR Bridge
Unknown**
Upper Guadalupe River Project Area
Guadalupe River Project Area (Downtown San Jose)
Lower Guadalupe River Project Area

* Includes estimated 3,000 cfs pumped inflow from storm drains installed or proposed to be installed by the cities of San Jose and Santa Clara and Caltrans.

** Existing channel capacity is less than or equal to 14,000 cfs. With completion of the Lower Guadalupe River Project, channel capacity is unknown pending further evaluation of alternatives.

Legend

9,100 Flow by Reach in the Guadalupe River Channel (cfs)

Source: 100-year design floodflow is based on U.S. Army Corps of Engineers (1993).

Figure 6.2-3. Flows on the Guadalupe River at the Peak of the 100-Year Design Floodflow – Cumulative Conditions

It is assumed that the Upper Guadalupe River Project, Guadalupe River Project with Proposed Action, and Lower Guadalupe River Project are all constructed and operational. Design flood flows would not break out between I-280 and Highway 101 or between Highway 101 and the Alviso-UPRR Bridge.

6.2.2.3 Hydrologic and Hydraulic Conditions

As discussed in Section 5.1, "Hydrologic and Hydraulic Consequences," hydraulic conditions such as depth and velocity would change in the natural Guadalupe River channel following completion of the Upper Guadalupe River Project and Guadalupe River Project with Bypass System Alternative.

A key hydraulic design feature of the bypass systems proposed for the Upper Guadalupe River Project and the Guadalupe River Project with Bypass System Alternative is that they start operating only when the flows in the river exceed approximately 1,500 cfs. The channel maintenance flows, which are approximately 1,200 cfs, would therefore remain in the river. As described in Section 5.2, "River Geomorphology," and Section 5.6, "Biological Resources – Fish," channel maintenance flows are important in maintaining sediment transport continuity that in turn affects maintenance requirements and aquatic habitat features.

The potential changes in flow depth and velocity in the Lower Guadalupe River Project area are not known because the design has not been determined and any changes in flow would depend on the features of the project, such as bypasses and other channel modifications. If bypasses are included in the Lower Guadalupe River Project, similar design considerations for maintaining channel maintenance flows in the river would be implemented.

When the river is flowing at or below the channel maintenance flow and the bypasses are not operating, the velocities in the natural channel will be unaffected in all areas except where armoring is instituted in the channel bed (Table 5.1-2). Velocities would be expected to be slightly greater in armored areas than under existing conditions due to reduced channel roughness.

When floodflows exceed the channel maintenance flows and some of the flow is conveyed by the bypass systems of the Upper Guadalupe River Project and the Guadalupe River Project with Bypass System Alternative, velocities in the natural channel may increase or decrease depending on specific hydraulic characteristics of a particular channel segment and the downstream channel segments (Table 5.1-2). Under the 2-year design flood, mean channel velocities would decrease with implementation of the flood protection projects. Under high flow conditions (20-year and greater floods), preliminary analysis indicates that velocities would decrease in bypassed segments compared to existing conditions but increase in armored sections (Section 5.1, "Hydrologic and Hydraulic Consequences"). Overall, velocities during high flows will be greater than under existing conditions because floodflows will remain in the river with completion of the flood protection projects.

Until the design of the Lower Guadalupe River Project is determined, the effects of projects described in Section 6.2.1, "Projects Addressed in the Cumulative Impact Analyses," on velocities in the lower Guadalupe River cannot be specified. Potential impacts will be considered in the design and analyzed in the environmental review of the Lower Guadalupe River Project. See Section 6.2.3, "Cumulative Impacts on River Geomorphology," and Section 6.2.7, "Cumulative Impacts on Biological Resources – Fish," for discussion of the potential effects of changes in flow velocity on river geomorphology and fish.

Potential changes in the volume of freshwater entering the South Bay are a concern because conversion of salt marsh is associated with changes in South Bay salinity levels; freshwater inflows may reduce salinity levels. However, the total volume of flow discharged to the

South Bay during any flood would not change appreciably with completion of the major projects in the Guadalupe River watershed. The time it would take for the total volume of floodflows to reach the South Bay could be shorter than under existing conditions because flows would be contained in the channel instead of flooding adjacent areas. However, there may be little or no reduction in the overall time it takes for floodflows to reach the South Bay if the Lower Guadalupe River Project includes levee setbacks, offstream storage, floodplain terrace, or a combination of these alternatives. If floodwalls were constructed on the existing levees in the Lower Guadalupe River Project area, the total volume of floodflows might reach the South Bay hours or a day earlier than under existing conditions, which would not be a substantial change. Because only a slight change in the time of delivery would occur and because flooding is infrequent, little or no adverse effect as a result of any change to the freshwater load to the South Bay would be expected with completion of the flood protection projects in the Guadalupe River watershed. This cumulative impact is therefore considered to be less than significant. The Lower Guadalupe River Project EIR/EIS and BA will address the potential direct, indirect, and cumulative impacts of each alternative on hydrologic and hydraulic conditions in the Guadalupe River, including the Alviso Slough area. The environmental document for the Lower Guadalupe River Project will also address the cumulative impacts of all projects in the Guadalupe River watershed, including the Guadalupe River Project with Bypass System Alternative.

See Section 6.2.6, "Cumulative Impacts on Biological Resources – Wildlife," for additional discussion of the effects on listed species if a cumulative hydrologic or hydraulic impact is identified in the BA for the Lower Guadalupe River Project.

6.2.3 Cumulative Impacts on River Geomorphology

The assessment of potential cumulative impacts of projects in the Guadalupe River watershed on channel erosion and deposition and river morphology is based primarily on the following reports:

- Sediment Transport Modeling Study of the Upper Guadalupe River – Phase 2 (Philip Williams & Associates, 1996)
- General Design Memorandum, Guadalupe River, California (U.S. Army Corps of Engineers, 1991b)
- Guadalupe River, California General Design Memorandum, Revised (U.S. Army Corps of Engineers, 1993)
- Guadalupe River Bypass, Hydraulic Analyses (Northwest Hydraulic Consultants, 1999)
- Lower Guadalupe River Sedimentation Study (Northwest Hydraulic Consultants, 2000)

6.2.3.1 Construction Impacts

Channel Erosion and Deposition. All the projects in the area have or will have the potential to contribute to erosion and increased sedimentation in the Guadalupe River during their construction. However, these projects have implemented or will implement construction-period erosion-control programs. Therefore, no significant cumulative impacts are expected during construction.

River Morphology. Construction of the flood protection projects have or will have features that locally affect the channel form: the pattern of pools, runs, and riffles. The features include invert stabilization structures, energy dissipaters, weirs, channel bed armoring, low-flow channels, and other armor features. Some of these features will result in a narrower low-flow channel that has higher velocities than the existing channel. These features would not alter the sediment load and are limited in length with respect to the river as a whole; therefore, no significant cumulative impacts on river morphology are expected as a result of construction of the flood protection projects. Changes in channel form, however, may change the suitability of the affected channel reaches for aquatic species. Cumulative impacts on aquatic species are discussed in Section 6.2.7, "Cumulative Impacts on Fish."

6.2.3.2 Operational Impacts

Channel Erosion and Deposition. The Lower Guadalupe River Sedimentation Study (Northwest Hydraulic Consultants, 2000) evaluated sediment load and sediment transport within the Guadalupe River watershed. This preliminary planning level study considers the sediment load and transport with all of the flood protection projects in place and operational. Under all flood scenarios, the wash load (fine sediments) passes through the river to San Francisco Bay unaffected by operation of the flood protection projects.

Under all flood conditions, more than 92 percent of the bedload sediment settles out between Trimble Road and Montague Expressway in the Lower Guadalupe River Project area (Northwest Hydraulic Consultants, 2000). This result is similar to existing conditions. The cumulative impact of all the flood protection projects in the Guadalupe River watershed is to continue the sediment transfer capability of the higher gradient reaches of the river, upstream from I-880, by confining all floodflows to the channel (Northwest Hydraulic Consultants, 2000). The bedload will settle out in the lower gradient reaches of the river between Trimble Road and Montague Expressway. The sedimentation study indicates that approximately 5 percent of the bedload settles in the reach between Montague Expressway and the Alviso UPRR Bridge. The study area did not extend downstream from the Alviso UPRR Bridge so the fate of the remaining 5 percent+ of bedload is not known. The analysis demonstrates that on a watershed basis, the transport of the bedload would not be affected by project operations.

Localized areas of channel erosion and deposition in the affected reaches of the river may change in response to the magnitude and duration of a flood. The Guadalupe River Project with Bypass System Alternative and the Upper Guadalupe River Project are expected to reduce channel erosion in the bypassed sections of the natural river channel during higher floodflows because the bypasses in both project areas will reduce the maximum flow in the natural channel (Section 6.2.2.3, "Hydrologic and Hydraulic Conditions"). In addition, the invert stabilization structures proposed for the Guadalupe River Project with Bypass System Alternative in the natural channel in Segments 3A and 3B and in Segment 1 and 2, if needed, will improve channel-bottom stability, reduce incision, and encourage the development of plunge pools and gravel-bar sequences in the channel.

To reduce the potential for adverse impacts on the channel form from erosion and deposition, the Corps will continue to refine movable bed modeling (HEC-6) during the design phase of the Guadalupe River Project with Bypass System Alternative. In addition, HEC-6 modeling will be conducted during the design phase of the Lower Guadalupe River

Project. The HEC-6 modeling will help in the selection and design of appropriate channel features that would, if necessary, protect the channel from erosion. Although a specific alternative has not been selected for the Lower Guadalupe River Project, the selected solution will likely have features to prevent erosion of the natural channel. Based on preliminary planning level analyses of the Guadalupe River (Northwest Hydraulic Consultants, 2000, Santa Clara Valley Water District, 1997a), it is expected that installation of channel features for the Lower Guadalupe River Project, such as invert stabilization structures, rock weirs, or biotechnical bank stabilizers, would be able to avoid or minimize additional areas of channel erosion. Cumulative impacts related to channel erosion and deposition due to projects in the Guadalupe River watershed would be less than significant.

As described in Sections 1.6.15 and 6.2.1.11, "Santa Clara Valley Water District Stream Maintenance Program," SCVWD is developing a Programmatic EIR for its Stream Maintenance Program that will address the potential effects of ongoing channel maintenance on the entire Guadalupe River, including the project area. Continuance of the existing maintenance practices, including bank stabilization and sediment and woody debris removal, are the only regular maintenance activities that would be required for maintenance of the as-built designs of the river channel specified in the Bypass System Alternative.

River Morphology. Diversion of floodflows into the bypass systems of the Guadalupe River Project with Bypass System Alternative and Upper Guadalupe River Project would reduce maximum flow in the natural channel. These diversions, however, are expected to have minimal impacts on the magnitude and duration of flows responsible for channel formation. Channel-maintenance and gravel-flushing flows will remain in the natural channel to maintain channel form and gravel quality. The most recent hydrologic data from Stream Gage 23B (Figure 6.1-1), which is upstream from all proposed bypasses, indicate that the channel-maintenance flow (the 1.5-year recurrence interval flow) is approximately 1,200 cfs. This flow is somewhat lower than the proposed minimum flow (1,500 cfs) required to initiate diversion into the bypass channels. Diverting a portion of floodflows that exceed 1,500 cfs to the bypass systems would not affect the frequency or duration of channel maintenance flows in the natural channel. Floodflow diversion would not increase the amount of fine sediment deposited in the natural channel. Consequently, there would be no change in channel maintenance processes for riffles, runs, and pools and transport of the river's sediment load over the long term. Therefore, no significant cumulative impact on river morphology would result from operation of the Guadalupe River Project with Bypass System Alternative and Upper Guadalupe River Project.

The potential impacts of the Lower Guadalupe River Project on river morphology, such as the pattern of riffle, run, and pool habitats, cannot be determined until specific alternatives are identified and analyzed. Potential adverse impacts of the Lower Guadalupe River Project will be avoided by designing the Lower Guadalupe River Project to maintain the appropriate channel-maintenance and gravel-flushing flows.

Because of the low-flow channel design features, such as invert stabilization structures and rock weirs, incorporated into the Upper Guadalupe River Project and the Guadalupe River Project with Bypass System Alternative and the commitment to address erosion and deposition processes in the Lower Guadalupe River Project, no significant cumulative impacts on river morphology are expected as a result of the projects. Any impacts of the

Lower Guadalupe River Project on river morphology will be analyzed in the environmental documents for that project. The cumulative impacts of the Lower Guadalupe River Project in association with other past, present, and reasonably foreseeable future projects will also be addressed.

6.2.4 Cumulative Impacts on Water Quality

6.2.4.1 Suspended Solids and Biostimulatory Nutrients

Construction-Related Disturbances. Construction of flood protection components in the Guadalupe River watershed have the potential to cause temporary and intermittent increases in suspended solids or concentrations of biostimulatory nutrients (nitrogen and phosphorus) in the Guadalupe River. Biostimulatory nutrients are primarily associated with fine sediments and particulate organic matter. Construction activities that would disturb channel and streambank sediments may occur simultaneously, causing an increase in turbidity and higher concentrations of suspended solids and biostimulatory nutrients in the water than would result from each individual project.

However, these impacts would not be expected to adversely affect the beneficial uses of the Guadalupe River described in the Basin Plan (Section 4.3, "Water Quality") or result in long-term degradation of water quality in the river because of regulatory requirements that must be followed during construction. Soil-disturbing projects that affect more than 5 acres are required to obtain an NPDES stormwater permit and to implement an associated SWPPP that specifies BMPs for erosion control. In addition, soil-disturbing activities will be conducted in compliance with approved erosion and sediment control, vegetation removal, and mitigation and monitoring plans. The cumulative impacts of suspended solids resulting from the incremental contributions of flood protection and other construction activities in the Guadalupe River watershed are therefore less than significant.

Operation-Related Disturbances. As discussed in Section 6.2.3, "Cumulative Impacts on River Geomorphology," operation and maintenance of the flood protection projects on the Guadalupe River would not cause long-term changes in the transport of wash load sediments in the channel. Wash load is defined as suspended sediments consisting of fine clays, silts, and sands. Wash load sediments are mobilized at relatively low streamflow velocities compared to the velocities required to transport coarser bedload materials. Under cumulative conditions, velocities during high flows are expected to be greater than existing conditions upstream from I-280, through much of the downtown San Jose area, and downstream to San Francisco Bay. Velocities during high flows will be greater than existing conditions because floodflows will remain in the river with completion of the flood protection projects listed in Section 6.2.1, "Projects Addressed in the Cumulative Impact Analyses." However, the lower flow velocities that are responsible for mobilizing fine sediments associated with wash load would not change. Consequently, there would be no water quality impacts associated with wash load sediments as a result of the Guadalupe watershed.

Maintenance activities, such as debris removal, storm drain outlet maintenance, and minor repairs may cause temporary and intermittent disturbances of channel and bank sediments. However, in-channel maintenance activities affecting water quality are likely to be infrequent and are unlikely to be concentrated in any one area of the river. Consequently, long-term operations and maintenance of Guadalupe River flood protection facilities would not be anticipated to adversely affect beneficial uses of the river or result in the degradation of water quality. The cumulative impacts of incremental changes in the transport of wash load sediments would therefore be less than significant.

Regional Water Quality Controls. The City of San Jose is a participant in the Santa Clara Valley Nonpoint Source Pollution Control Program and a co-permittee to the Program's NPDES permit for municipal storm water discharges, issued by the RWQCB. This permit includes requirements for water quality monitoring, identification and elimination of illicit connections and illegal dumping to the stormdrain system, street cleaning, and public education programs. In addition, this permit requires more stringent standards for land use decisions and site design criteria. The City of San Jose's 2020 General Plan (City of San Jose, 1994) includes the following goals and policies that would reduce the potential for impacts on local and regional water quality and mitigate potential water quality impacts on a less-than-significant level:

Natural Resources-Water Resources:
Policy 1. The City, in cooperation with the Santa Clara Valley Water District, should restrict or carefully regulate public and private development in watershed areas, especially those necessary for the effective functioning of reservoirs, ponds, and streams, and for the prevention of excessive situations.

Policy 3. The City should encourage the Santa Clara Valley Water District to restrict public access and recreational uses on water related lands when water quality could be degraded.

Policy 6. When new development is proposed in areas where storm runoff will be directed into creeks upstream from groundwater recharge facilities, the potential for surface water and groundwater contamination should be assessed and appropriate preventative measures should be recommended.

Policy 7. The City shall require the proper construction and monitoring of facilities storing hazardous materials in order to prevent contamination of surface water, groundwater, and underlying aquifers. In furtherance of this policy, design standards for such facilities should consider high groundwater tables and/or the potential for freshwater or saltwater flooding.

Policy 8. The City should establish nonpoint source pollution control measures and programs to adequately control the discharge of pollutants into the City's storm sewers.

Policy 9. The City should take a proactive role in the implementation of the Santa Clara Valley Nonpoint Source Pollution Control Program, as well as implementation of the City's local nonpoint source control and stormwater management program.

Natural Resources – Bay and Baylands:
Policy 5. The City should continue to participate in the Santa Clara Valley Nonpoint Source Pollution Control Program and take other necessary actions to formulate and meet regional water quality standards which are implemented through National Pollutant Discharge Elimination System permits and other measures.

6.2.4.2 Toxic Contaminants – Accidental Spills of Construction-Related Materials

Accidental spills of construction materials harmful to aquatic organisms, such as concrete, sealants, oil, and other fuels, during construction of projects in the watershed could contribute to cumulative impacts on water quality. Although they would be infrequent and not intentional, accidental spills could occur during construction in stream channels or on the banks of stream channels.

Implementation and enforcement of toxic materials control and spill-response plans are required for major construction projects that receive permits under the NPDES stormwater permit process. As described in Section 3.4.3, "Environmental Commitments," these plans define procedures that must be followed for hazardous material storage and containment and for vehicle and equipment maintenance to avoid and minimize impacts on water quality. The cumulative impacts of toxic contaminants would be less than significant because toxic materials control and spill-response plans would be implemented for major construction projects in the watershed to avoid or control potential accidents.

6.2.4.3 Toxic Constituents – Mercury

As described in Section 1.5.3.1, "Regional and Local Requirements – San Francisco Bay Regional Water Quality Control Board and State Water Resources Control Board," and Section 4.3, "Water Quality," the San Francisco Bay RWQCB recently prepared a draft total maximum daily load (TMDL) program for mercury for San Francisco Bay (San Francisco Bay Regional Water Quality Control Board, 2000). The program calls for significantly reducing the transport of mercury from the Guadalupe River system to the bay. The San Francisco Bay RWQCB has determined that if the mercury load in the river system could be reduced to pre-Gold Rush era levels, it is highly probable that standards for mercury in the bay would be achieved.

Most of the mercury in the Guadalupe River watershed is bound to sediments and particulates. The sediments of greatest concern are those transported and deposited along the banks of the Guadalupe River when mercury-bearing ore was mined in the upper watershed during the Gold Rush.

Mercury concentrations can vary greatly in sediments from different areas of the Guadalupe River watershed. The potential for adverse environmental effects from sediment-bound mercury in the watershed depends on the source, transport, and deposition characteristics of such mercury.

Complex physical and chemical conditions of the aquatic environment, such as pH, organic carbon, and dissolved oxygen, can affect mercury methylation rates. Methylation of mercury is a significant concern because methylated forms of mercury can be absorbed readily by aquatic organisms, causing toxic reactions and tissue accumulation.

The methylation process depends on environmental conditions, such as pH, dissolved organic carbon, temperature, sulfates, and light. Many of these factors are affected by biological processes, such as growth and decay.

Controlling sediment in the Guadalupe River is crucial for complying with the reduction in mercury levels recommended in the TMDL. Consequently, potential changes in sediment sources and transport characteristics in the Guadalupe River system resulting from projects in the watershed are analyzed in this cumulative impact analysis. Operation of the proposed flood protection projects and the Guadalupe Creek Restoration Project would not change the amount or rate of sediments entering the Guadalupe River from sources such as surface runoff and storm drains. Also, the volume of mercury-bearing sediments entering the Guadalupe River from abandoned mines and other sites in the watershed upstream from the confluence of Guadalupe and Alamitos Creeks occurs independent of the proposed flood protection projects or other projects in the Guadalupe River watershed.

As part of its ongoing maintenance activities, SCVWD periodically would remove bedload sediment that accumulates in the channel between Trimble Road and Montague Expressway. Sediment currently accumulates in this area and will continue to do so regardless of whether the project is constructed. As discussed in Section 6.2.3.2, "Cumulative Impacts – Operational Impacts," sediment transport studies for the Guadalupe River indicate that over 92 percent of the bedload would continue to be deposited between Trimble Road and Montague Expressway after all flood protection projects are operational. Such sediment removal is anticipated to be necessary to maintain channel capacity for conveying flood waters. Removal of sediment containing excessive levels of mercury would be considered beneficial to the overall goal of the San Francisco Bay RWQCB's TMDL program for mercury.

As described in Section 6.2.3.2, "Cumulative Impacts – Operational Impacts," operation of the proposed flood protection projects on the Guadalupe River would cause local changes to existing erosion and sediment deposition patterns. As explained in Section 4.3.2, "Toxic Constituents," some sediments that would be affected by such changes could contain unacceptable levels of mercury. However, although mercury-bearing sediments have the potential to be transported in either the suspended wash load or the bedload, net erosion caused by peak flow conveyance in the Guadalupe River system is expected to be reduced by implementing the proposed flood protection projects, including invert stabilization structures, bypasses, channel bed and bank armoring, additional vegetative bank cover, and bank management.

The flood protection projects would not affect the source or input of mercury into the system. Therefore, the existing mercury budget for the Guadalupe watershed would not increase because of construction of the projects. As described in Section 3.4.3, "Bypass System Alternative – Environmental Commitments," an erosion and sediment control plan would be implemented for the Guadalupe River Project with Bypass System Alternative to avoid sediment discharges into the river during construction activities. The erosion and sediment control plan would require contractors to:

- conduct all construction work in accordance with site-specific construction plans that minimize the potential for sediment input to the stream
- grade spoil sites to minimize surface erosion and apply erosion control measures as appropriate to prevent sediment from entering water courses or the stream channel, to the extent feasible
- avoid operating equipment in flowing water by using temporary cofferdams or some other suitable diversion to divert channel flow around the channel and bank construction area

In addition, a soil management plan would be implemented for the Guadalupe River Project with Bypass System Alternative that would provide procedures for classifying soils, as well as procedures and criteria for disposal and reuse. Prior to project implementation, the soil management plan will be updated to reflect final project design and to incorporate input from RWQCB regarding management of soils containing elevated mercury concentrations. The updated soil management plan will be submitted to RWQCB for approval prior to implementation.

The following restrictions on soil management would be included in the soil management plan submitted to RWQCB for approval:

- Sediments with mercury concentrations that exceed hazardous waste criteria under federal or state law must be disposed offsite in appropriately licensed disposal sites. The determination of hazardous properties shall comply with all applicable statutes and regulations pertaining to hazardous wastes.
- Excavated soils with mercury concentrations not exceeding hazardous waste criteria but greater than 1 mg/kg may not be reused onsite unless such soils are placed above the low flow channel or in adjacent areas where frequent exposure to overbank flow is not anticipated to occur; above the water surface elevation defined by the 3-year recurrence interval.
- Excavated surfaces above the 3-year recurrence interval elevation that contain mercury concentrations higher than hazardous waste levels will be overexcavated and replaced with soils meeting the above criteria for onsite reuse. Excavated surfaces below the 3-year recurrence interval elevation which contain mercury concentrations greater than 1 mg/kg will be overexcavated and replaced with clean imported soil.
- The limitations on onsite reuse of excavated soils and sediments would also apply to operation and maintenance activities throughout the life of the proposed project.

The potential for conversion of sediment-bound mercury into soluble methyl mercury exists in any wetland or shallow sediment deposit. Although recent monitoring in Guadalupe Creek found methyl mercury production throughout the restoration project area and upstream within the pore water of the first 2 cm of creek sediment (Santa Clara Valley Water District and U.S. Army Corps of Engineers, 2000b), the formation rate could not be determined based on the limited sampling program conducted. These projects also have the potential to change the future distribution of methyl mercury because projects in the Guadalupe River watershed could slightly alter the ongoing pattern of erosion and sediment deposition (Section 6.2.3.2, "Cumulative Impacts on River Geomorphology – Operational Impacts"), but almost no information exists on the existing transport of sediment - bound mercury, the existing locations of mercury deposition, or the existing rate of methyl mercury formation in the Guadalupe River system (Section 4.3.2, "Toxic Constituents"). The flood protection projects on the Guadalupe River and the Guadalupe Creek Restoration Project are expected to result in the following:

- The projects would not change the amount or rate of sediments entering the Guadalupe River from sources such as surface runoff and storm drains.

- Net erosion caused by peak flow conveyance in the Guadalupe River system is expected to be reduced by implementing the projects.
- The overall rate of erosion and sediment deposition on a watershed scale is not expected to change and may be reduced with the implementation of the projects.

Despite the project benefits outlined above, mercury and the potential for methylation in the Guadalupe River watershed will be an ongoing regional concern. Leaching of mine tailings and overland flow of mercury-rich soils have resulted in the downstream accumulation of mercury in the Guadalupe River watershed, thereby contaminating the river and its tributaries, including Guadalupe Creek and Alamitos Creek. This issue constitutes an ongoing significant cumulative impact under NEPA and CEQA.

The following mitigation measures would avoid and minimize cumulative impacts from disturbance and transport of methyl mercury in the watershed, resulting in a less-than-significant cumulative impact.

Assess Mercury Transport and the Potential for Methylation in the Guadalupe River Watershed. SCVWD is committed to participating with the San Francisco Bay RWQCB and other appropriate agencies in assessing mercury transport in the Guadalupe River and the potential for methylation associated with any wetland and riparian mitigation on SCVWD's lands as part of the mercury TMDL program for San Francisco Bay and the Guadalupe River. SCVWD will coordinate with the San Francisco Bay RWQCB regarding monitoring methods for the proposed monitoring program. SCVWD's participation will include continuous monitoring of flow, as well as monitoring of total suspended solids and total and bioavailable mercury.

Methyl mercury concentrations in channel bed sediments of the Guadalupe River will also be monitored. SCVWD monitoring of methyl mercury concentrations will be conducted in freshwater, seasonal wetland, and riparian environments at sites approved by the San Francisco Bay RWQCB. Monitoring will be conducted for 5 years starting in 2001. Watershed monitoring will be coordinated with pre- and postproject monitoring as described in Section 5.3.3.3, "Toxic Constituents – Mercury" and other localized monitoring efforts in the watershed such as on Guadalupe Creek. The data collected from the monitoring will be used by SCVWD and the San Francisco Bay RWQCB to develop BMPs to minimize methylation and the overall transport of mercury-laden sediments to San Francisco Bay.

Although this monitoring would assist in the San Francisco Bay RWQCB's efforts to minimize and manage the adverse effects of mercury in Guadalupe River sediments, the most effective way to reduce the amount of mercury in the Guadalupe River is to control its discharge to the river from sources in the upper watershed. However, such actions are beyond SCVWD's authority and jurisdiction. Ultimately, regional implementation of the TMDL will be necessary to solve the regional mercury contamination problem.

Develop and Implement the TMDL or Similar Program for Mercury for San Francisco Bay. The San Francisco Bay RWQCB is developing a TMDL for mercury for the San Francisco Bay and has the responsibility and jurisdiction to implement it. The TMDL program proposes a significant reduction in the transport of mercury to the San Francisco Bay from the Guadalupe River system. The goal of the TMDL for mercury in the San Francisco Bay region is to reduce in-bay sediment concentrations to less than 0.4 mg/kg in fine sediments less than 63 micrometers. The TMDL will identify involved parties and their proportional responsibility for the reduction of mercury inputs to the San Francisco Bay. SCVWD will participate in the TMDL program.

6.2.4.4 Temperature

Cumulative impacts of projects in the Guadalupe River watershed on water temperature primarily result from the removal of riparian vegetation and shading along the river corridor. Consequently, river water temperatures would be affected primarily by construction of the three flood protection projects. As described in Section 5.3, "Water Quality," the JSATEMP model was used to evaluate the potential impacts on water temperature in the Guadalupe River. For this analysis of cumulative impacts, impacts on water temperature were evaluated for the construction and operation of the Upper Guadalupe River Project in combination with the Guadalupe River Project with Bypass System Alternative. The analysis included a postproject construction scenario and a postmitigation scenario. The postmitigation modeling scenario includes planting of riparian vegetation to provide shade at the Upper Guadalupe River Project site, the Guadalupe River Project site, and the Guadalupe Creek and Reach A mitigation sites. The Lower Guadalupe River Project area is not included in this cumulative temperature analysis because the final design of the Lower Guadalupe River Project has not been determined.

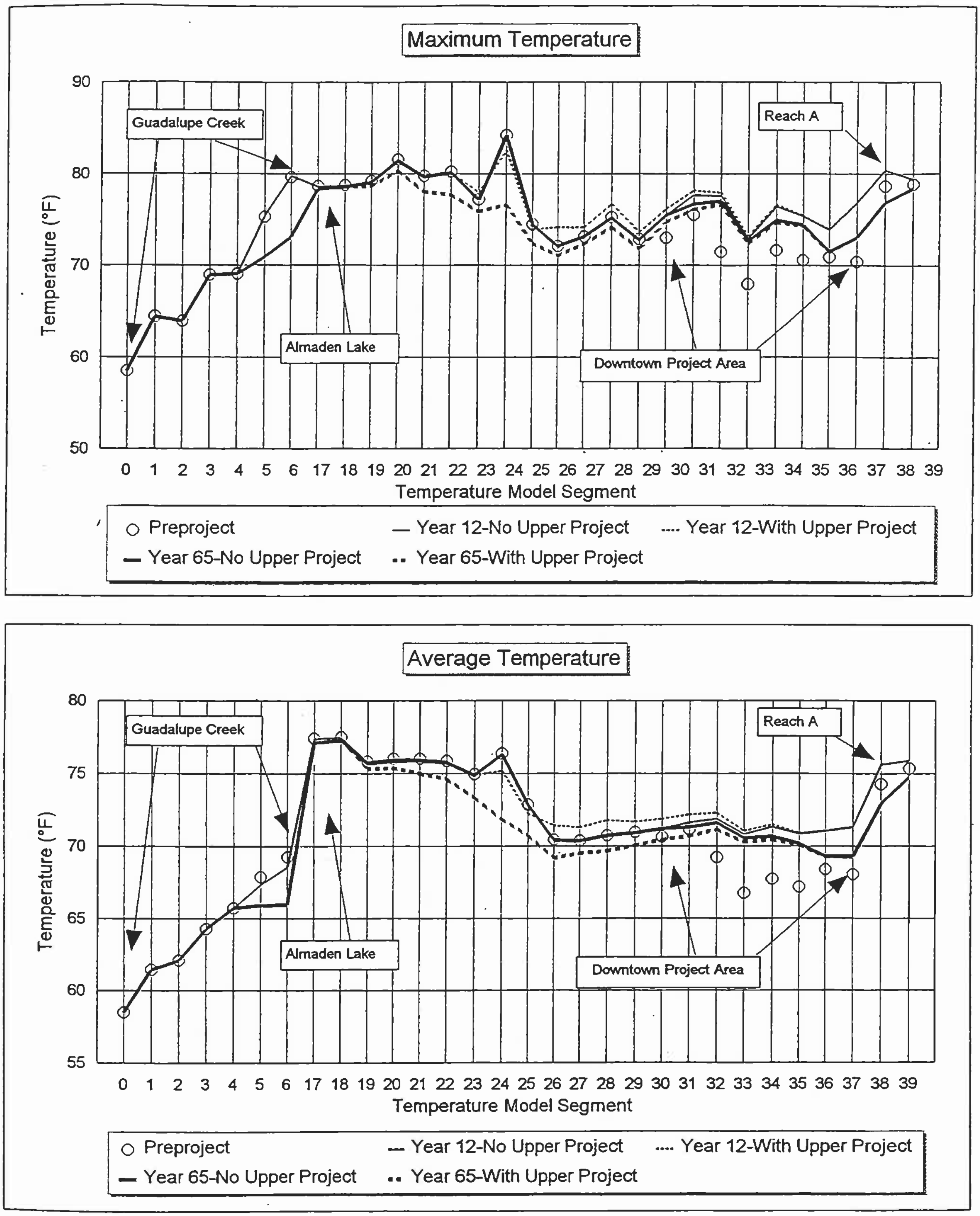
Water temperatures in the Guadalupe River are likely to increase immediately after construction of the Upper Guadalupe River Project. Increased water temperatures caused by the Upper Guadalupe River Project are expected to be greatest in year 12 of the 25-year construction period for that project, which is approximately 10 years after the scheduled completion of the Guadalupe River Project with Bypass System Alternative (Santa Clara Valley Water District and U.S. Army Corps of Engineers, 1998). Because its construction would cause warmer water to flow into the downstream project area, the Upper Guadalupe River project would result in a cumulative impact on water temperatures because it would add to the water temperature increases caused by the Guadalupe River Project with Bypass System Alternative alone. Construction of the Upper Guadalupe River Project would contribute relatively small increases to postproject water temperatures in the downtown project area. During year 12, the greatest incremental addition to the average maximum temperature (0.8 °F) in the downtown Project area would occur at the most upstream point in Segment 3 (model segment 30) during August of a dry-/median-year precipitation type (Figures 6.2-4 and 6.2-5). The total increase in the average maximum temperature at model segment 30 would be 3.2 °F. The largest combined temperature increase in year 12 would be 6.5 °F in model segment 32 in the downtown San Jose area. Downstream from Coleman Avenue and through Reach A and the Lower Guadalupe River Project area, postproject water temperatures would be no different than for the Guadalupe River Project with Bypass System Alternative alone.

Under postmitigation conditions for the combined Upper Guadalupe River Project and the Guadalupe River Project with Bypass System Alternative, shade provided by plantings of riparian vegetation would reduce the water temperatures to below postproject levels. Shade would begin to cool water temperatures immediately after establishment of new vegetation. The shade and cooling effect would increase over time and maximum shade value is expected at maturity of the SRA cover vegetation, within about 40 years of Project implementation. SRA cover vegetation planted as part of the Upper Guadalupe River Project would shade the river upstream from I-280 and reduce water temperatures in the Upper Guadalupe River Project area to levels lower than preproject levels (Figures 6.2-4 and 6.2-5). Temperatures in Guadalupe Creek would also be lower than preproject levels. Postmitigation temperatures downstream from I-280 would be slightly lower than postmitigation temperatures resulting from the Guadalupe River Project with Bypass System Alternative alone. However, temperatures downstream from I-280 would still be slightly elevated compared to preproject conditions. Temperatures in Reach A would be lower than under preproject conditions; water flowing from Reach A into the upper end of the Lower Guadalupe River Project would therefore be cooler than under existing conditions.

The cumulative postproject impacts on water temperature of the Upper Guadalupe River Project combined with the Guadalupe River Project with Bypass System Alternative are considered less than significant because postmitigation water temperatures would be reduced to preproject levels in most of the Guadalupe River watershed.

The cumulative impacts of the three flood protection projects on water temperatures in the Lower Guadalupe River Project area downstream from Reach A cannot be determined at this time because the final design of the Lower Guadalupe River Project has not been determined and detailed water temperature modeling has not yet been conducted. Water temperature modeling data (Figures 6.2-4 and 6.2-5) for the combined Upper Guadalupe River Project and the Guadalupe River Project with Bypass System Alternative indicate that postproject water temperatures below Reach A would be the same as under preproject conditions. Postmitigation temperatures for the combined Upper Guadalupe River Project and Guadalupe River Project with Bypass System Alternative would result in water temperatures that are cooler than preproject conditions below Reach A in the Lower Guadalupe River Project area. However, the Lower Guadalupe River Project may cause increased postproject water temperatures downstream from Reach A if SRA cover vegetation is removed or the stream channel is modified.

It is suspected that tidally caused mixing of Guadalupe River and San Francisco Bay water has a large influence on water temperatures in the tidally affected reach downstream from the Montague Expressway. The tidal mixing, upstream warming, and in-channel warming of the lower Guadalupe River from removal of SRA cover vegetation will be assessed in the environmental analysis for the Lower Guadalupe River Project in association with other past, present, and reasonably foreseeable future projects. The JSATEMP temperature model for the Guadalupe River is being modified to include simulation of the Lower Guadalupe River Project area. The modified JSATEMP model will be used to evaluate potential direct and cumulative temperature impacts on water temperature of all flood protection projects on the Guadalupe River. Temperature modeling will be used in part to define the quantity of mitigation plantings of riparian vegetation needed to mitigate water temperature impacts.

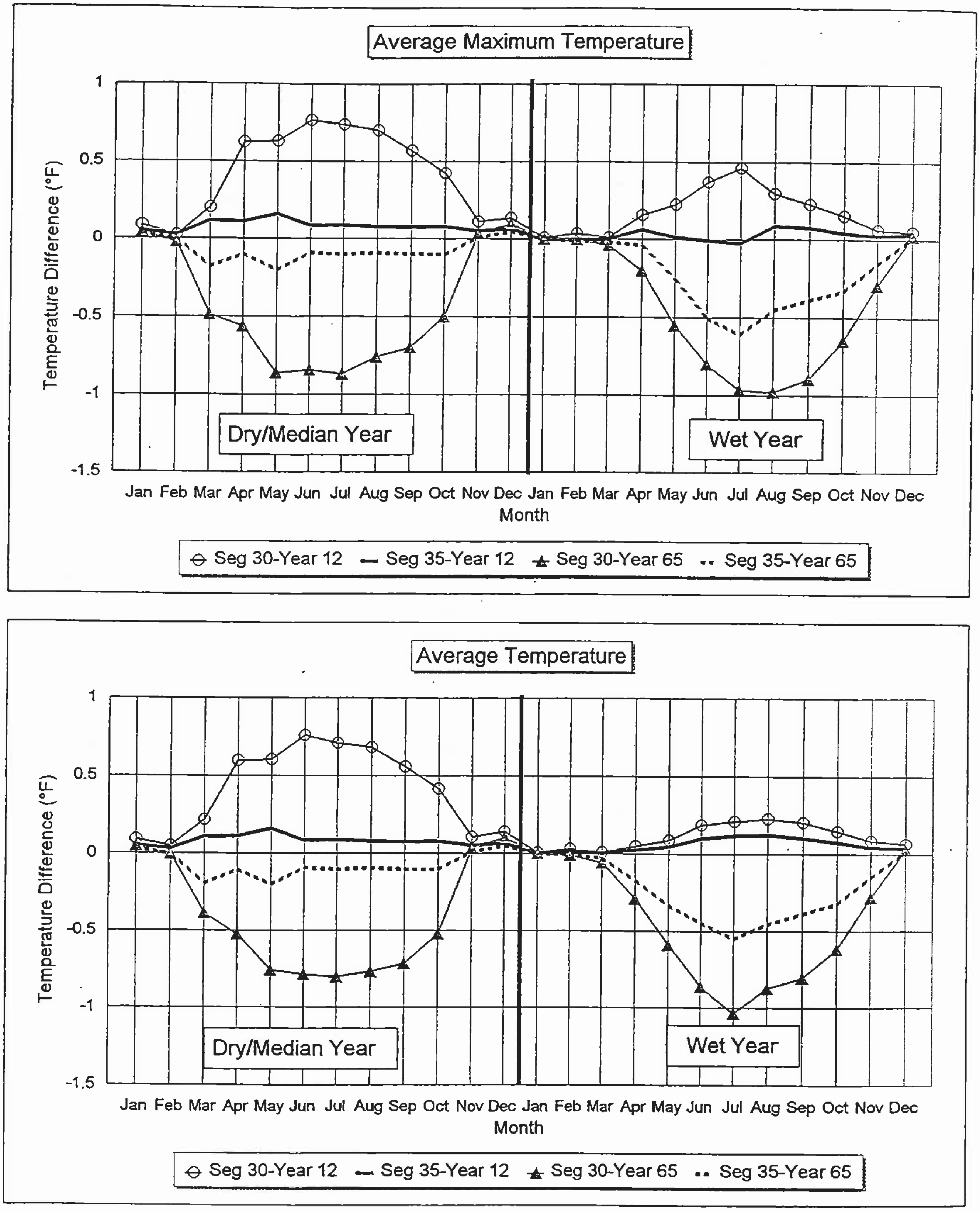


Preproject = 1990 conditions; Postproject = year 0 after construction; Postmitigation = year 40 after construction *Revised*

Note: "Upper Project" represents the Upper Guadalupe River Project

Figure 6.2-4 Simulated Temperatures for August of the Dry/Median Year for the Guadalupe River Project with Bypass System Alternative

The potential Guadalupe Creek mitigation site is represented by model segments 5-6; Segments 1, 2, and 3 of the Guadalupe River Project include model segments 30-37; and Reach A consists of model segments 38-39.



Designated years represent total time elapsed since construction of the Guadalupe River Project with Proposed Action *Revised*

Figure 6.2-5 Interrelated Effect of Upper Guadalupe River Project and Guadalupe River Project with Bypass System Alternative on Simulated Temperatures under Both Projects Minus Temperatures with only the Guadalupe River Project with Bypass System Alternative

The I-280 bridge is represented by model segment 30; Coleman Avenue is represented by segment 35.

6.2.4.5 Dissolved Oxygen

As described in Section 6.2.4.4, "Cumulative Impacts on Water Quality – Temperature," the combined Upper Guadalupe River Project and the Guadalupe River Project with Bypass System Alternative would cause an increase in average maximum temperature of 0.8 °F in the downtown San Jose area. The largest combined temperature increase due to the combined Upper Guadalupe River Project and Guadalupe River Project with Bypass System Alternative would be 6.5 °F between Park Avenue and West Santa Clara Street (model segment 32) (Section 6.2.4.4, "Cumulative Impacts on Water Quality – Temperature"). This temperature increase would result in a cumulative maximum decrease in dissolved oxygen concentrations of approximately 0.6 mg/L, which is approximately 0.1 mg/L less than the Guadalupe River Project with Bypass System Alternative alone (Section 5.3.3, "Water Quality – Bypass System Alternative").

The cumulative impact of increased water temperatures on dissolved oxygen concentrations of approximately 0.6 mg/L is considered less than significant because the decrease in dissolved oxygen concentrations is within the natural range of daily variations in dissolved oxygen.

Cumulative impacts on temperatures and associated impacts on dissolved oxygen concentrations downstream from Reach A following construction of the Lower Guadalupe River Project are not known because the project is in the early stages of planning and temperature modeling for the Lower Guadalupe River Project has not yet been conducted. Full maturation of the SRA cover vegetation mitigation plantings in Reach A is expected to result in net reductions in water temperatures entering the lower Guadalupe River. Consequently, dissolved oxygen levels of water entering the lower Guadalupe River from Reach A should be equal to or lower than under existing conditions. Reduced water temperatures have a beneficial impact on dissolved oxygen: the levels of dissolved oxygen tend to increase with reductions in water temperature. In the tidally influenced reach downstream from the Montague Expressway, cumulative impacts on dissolved oxygen would be less than in free-flowing stream reaches because daily tidal exchange would produce substantial mixing of river and San Francisco Bay water. Increased mixing of water generally increases aeration of the water and dissolved oxygen levels.

6.2.5 Cumulative Impacts on Biological Resources – Vegetation

This cumulative impact analysis is based on a reconnaissance-level field inventory of riparian habitats, including SRA cover vegetation, throughout the Guadalupe River system (The Habitat Restoration Group, 1990) and on a review of documents describing proposed and approved projects. This section includes an overview of historical changes in terrestrial habitat in the Guadalupe River system and an analysis of potential cumulative impacts on riparian vegetation, SRA cover vegetation, wetlands, and salt marsh habitat. Cumulative impacts on upland habitat are not expected to be significant because little upland habitat would be affected by projects in or directly adjacent to the Guadalupe River.

6.2.5.1 Riparian Vegetation

No previous studies have analyzed the cumulative impacts of projects in the Guadalupe River watershed on the historical extent and distribution of riparian habitat in the watershed. Substantial portions of the system have been highly disturbed since the 1930s.

Table 6.2-2 lists major water management and related projects that have been previously constructed, and they may have reduced the extent of riparian habitat along the Guadalupe River and its tributaries. In addition, many small commercial, industrial, residential, and agricultural development projects not listed in Table 6.2-2 have been constructed in the Guadalupe River watershed.

Historical human impacts in the Santa Clara Valley from agriculture, urban expansion, and water development have resulted in a substantial loss of riparian habitat in the Guadalupe River system. Fragmentation and disturbance of riparian habitat as well as a reduction in flooding and introduction of nonnative species have degraded much of the remaining habitat. Riparian habitat is currently found along 60.9 bank miles of the Guadalupe River watershed, representing 51.0 percent of the watershed total of 119.4 bank miles (Table 6.1-1). The Guadalupe River has approximately 16.5 bank miles of riparian habitat, representing 44.0 percent of the Guadalupe River's total of 37.6 bank miles, from the Alviso UPRR Bridge to the Guadalupe River's confluence with Alamitos Creek (Table 6.1-1). However, up to 6.0 bank miles of the Guadalupe River upstream from the Alviso UPRR Bridge is tidally influenced and supports little or no riparian vegetation. Therefore, the 16.5 bank miles of riparian habitat represents approximately 52 percent of the 31.6 bank miles of the Guadalupe River capable of supporting riparian vegetation. Approximately 4.0 bank miles have been modified, primarily in the last 60 years, through the installation of gabions, concrete lining, and riprap and widening and dredging. The remaining 11.1 bank miles of the Guadalupe River are now bare or have been converted to ruderal vegetation or upland landscaping. The impacts of these past activities are reflected in the description of the affected environment provided in Section 4.4, "Biological Resources – Vegetation." Existing areas of major vegetation types in the Guadalupe River watershed are summarized in Table 6.2-3.

Table 6.2-4 summarizes the approximate incremental and cumulative acreages of riparian habitat loss resulting from projects under construction or recently approved in the Guadalupe River watershed. Most of the impacts would be on cottonwood/willow forest, which has high botanical and wildlife values. The Upper and Lower Guadalupe River Projects and the Guadalupe River Project with Bypass System Alternative would contribute to impacts on approximately 27 acres of riparian habitat (approximately

TABLE 6.2-2. Historical Projects That Have Affected the Extent and Distribution of Riparian Habitat in the Guadalupe River Watershed

Affected Reach	Project Description	Construction Date
Guadalupe River		
Willow Glen Way to Willow Street	Lewis Canal	1866
Alviso Slough County Marina and Union Pacific Railroad to Highway 101	SCVWD channelization/levee improvements	1963 to 1965, 1985
Highway 101 to I-880	SCVWD channel excavation, levees adjacent to San Jose Airport	Late 1960s
Branham Lane to Blossom Hill Road	Gravel quarry operation	Before 1970s
Coleman Avenue to Blossom Hill Road	SCVWD percolation ponds: Los Capitancillos and Almaden	1970
Blossom Hill Road to Almaden Expressway and Coleman Avenue	SCVWD flood protection project, gabion slope protection, drop structure replacement, in-channel percolation ponds	1970, 1976

Ironwood Drive to Foxworthy Avenue, Almaden Expressway to 6,600 feet upstream	Santa Clara County Transportation Agency widening of Almaden Expressway, gabion slope protection, rock lining	1972 to 1973
From 4,150 to 8,240 feet upstream from Highway 237	Westerly bank levee	1974
Los Gatos Creek		
Downstream from Vasona Reservoir	Construction of Vasona Reservoir	1935
Downstream from Vasona Reservoir	Series of three drop structures	1972
Downstream from Lexington Reservoir	Construction of Lexington Reservoir	1952
Lexington Reservoir to Saratoga Avenue	Concrete channelization and levee slopes associated with construction of Highway 17	1966 to 1969
Ross Creek		
Confluence with Guadalupe River to Kirk Road	Channelization	1955
Camino del Cerro to Kirk Road	Channelization	1955
Canoas Creek		
Almaden Road to Canoas Creek	Channelization	1970
Nightingale Drive to Cottle Road	Channelization	1967
Almaden Expressway to Nightingale Drive	Channelization	1976
Guadalupe Creek		
Downstream from Guadalupe Reservoir	Construction of Guadalupe Reservoir	1935
Downstream from Guadalupe Reservoir	Construction of Masson Dam	Pre-1940
Confluence with Guadalupe River to Camden Avenue	SCVWD flood protection modified floodplain	1982
Alamitos Creek		
Downstream from Almaden Reservoir	Construction of Almaden Reservoir	1935
Camden Avenue to McKean Road	Grading, berms (private developer)	1975
Camden Avenue to Almaden Lake Park	SCVWD channelization	1980
Arroyo Calero		
Downstream from Calero Reservoir	Construction of Calero Reservoir	1935

Source: Santa Clara Valley Water District.

TABLE 6.2-3. Existing Vegetation Types Along the Guadalupe River Watershed

	Main Stem		Tributaries		System	
Habitat	**Acres**	**Percent of Total**	**Acres**	**Percent of Total**	**Acres**	**Percent of Total**
Riparian						
Sycamore	0	0	240.1	61	240.1	41
Cottonwood/Willow	95.8	49	9.9	3	105.7	18
Foothill	0	0	52.3	13	52.3	9
Mixed	0	0	5.8	1	5.8	1
Willow	0	0	3.0	1	3.0	1
Revegetation	1.1	1		0	1.1	<1

Subtotal	**96.9**	**50**	**311.1**	**80**	**408.0**	**70**
Nonriparian						
Upland Landscaping	5.5	3	6.2	2	11.7	2
Ruderal (Scrub and Herbaceous)	91.6	47	73.2	19	164.8	28
Bare	1.6	1	0.3	<1	1.9	<1
Subtotal	**98.7**	**50**	**79.7**	**20**	**178.4**	**30**
Total	**195.6**	**100**	**390.8**	**100**	**586.4**	**100**

Source: The Habitat Restoration Group, 1991 (unpublished data).

80 percent of the total in Table 6.2.4). A total of 100 percent of the riparian mitigation for the Guadalupe River Project with Bypass System Alternative has already been planted, 1 to 3 years prior to the implementation of project components that would result in approximately 50 percent of the impacts. The Upper Guadalupe River Project includes establishment of 65 percent of the proposed riparian forest mitigation prior to 4 percent of the impacts. The proposed SCVWD Stream Maintenance Program could affect from 75 to 600 acres of riparian habitat in the Santa Clara and Pajaro River Basins due to proposed revegetation, enhancement, and land management. Impacts would be fully mitigated. The other projects addressed in this cumulative impact analysis will also fully mitigate for impacts on riparian habitat. The projects included in Table 6.2-4 include mitigation site protection plans and vegetation protection plans, which avoid or minimize impacts during construction and after mitigation plantings.

Because of the early mitigation for riparian losses, no significant indirect or cumulative impacts on riparian vegetation are expected. No additional mitigation for the incremental impact of the Guadalupe River Project with Bypass System Alternative is required.

6.2.5.2 SRA Cover Vegetation

Implementing the Upper Guadalupe River Project would provide 4,886 lf of SRA cover vegetation mitigation and 1,720 lf of undercut bank mitigation. The Upper Guadalupe River Project also includes an additional 8,462 lf of SRA cover vegetation. The Guadalupe River Project with Bypass System Alternative would affect 8,821 lf of SRA cover vegetation and would provide approximately 18,026 lf of SRA cover vegetation mitigation. The Santa Clara Valley Water District Fish Ladder Construction Program affected 82 lf of SRA cover vegetation, which was mitigated directly upstream from the project site. The Guadalupe Creek Restoration Project would affect an estimated 240 lf of SRA cover vegetation. The potential impacts of the Lower Guadalupe River Project on SRA cover vegetation cannot be determined at this time. However, it is possible that some cumulative impacts may result. Any impacts that the Lower Guadalupe River Project may have on SRA cover vegetation will be analyzed in the environmental documents for that project. The cumulative impacts of the Lower Guadalupe River Project in association with other past, present, and reasonably foreseeable future projects will also be addressed.

Direct loss of SRA cover vegetation resulting from implementation of the projects discussed above will be fully mitigated. For the Upper Guadalupe River Project, 92 percent of the proposed SRA cover vegetation mitigation will be established before 9 percent of the project's impacts on SRA cover vegetation occurs. For the Guadalupe River Project with Bypass System Alternative, approximately 100 percent of the proposed SRA cover vegetation mitigation will be established before 51 percent of the project's impacts on SRA cover vegetation occurs. The two projects combined will result in a more than doubling of the SRA cover vegetation along the Guadalupe River compared with existing conditions. The cumulative impact of removing streamside vegetation is therefore considered less than significant, and no additional mitigation is required.

TABLE 6.2-4. Projects with Direct Cumulative Impacts on the Riparian Habitat in the Guadalupe River Watershed and Mitigation Required (acres)

	Impact	Mitigation
Guadalupe River Project with Bypass System Alternative	14.12	21.0
Guadalupe River Park Project	0.0[a]	0.0[a]
State Route 87 Freeway Upgrade from Highway 101 to Julian Street	5.74	10.95
State Route 85 Transportation Corridor Project	0.1[b]	12.1
Santa Clara Valley Water District Fish Ladder Construction Program	0.1	0.2
Guadalupe Creek Restoration Project	0.51	1.00
Upper Guadalupe River Flood Control Project	10.45	20.89[c]
Lower Guadalupe River Flood Protection Project	2.5[d]	2.5[e]
SCVWD Stream Maintenance Program (proposed)	75.0[f]	75.0[f]
Los Gatos Creek Trail Project Phase IIA.A	0.25	0.62
Vasona Light Rail Extension Project	0.23	0.23
Total	**110.00**	**144.49**

[a] Riparian impacts and mitigation are included in the Guadalupe River Project with Bypass System Alternative.

[b] The project will directly affect 0.1 acre of riparian vegetation along the Guadalupe River main stem and indirectly affect 4.5 acres on Los Gatos and Ross Creeks. Mitigation for loss of riparian habitat requires planting 12.1 acres of riparian vegetation onsite and 0.2 acre offsite (Monette, 1992).

[c] An additional 5.53 acres will be established by SCVWD for use as mitigation for other projects.

[d] Assumes the sediment removal alternative is selected.

[e] Estimate.

[f] Estimate: includes proposed revegetation, enhancement, and land management (Santa Clara Valley Water District, 2000). Amount could range from 75 to 600 acres.

6.2.5.3 Wetlands

The Guadalupe River Project with Bypass System Alternative would not affect jurisdictional wetlands (Section 5.4.3.3, "Wetlands"). The Guadalupe Creek Restoration Project, the Upper Guadalupe River Project, and the Vasona Light Rail Extension Project would result in impacts on 0.94, 1.47, and 0.41 acres of jurisdictional wetlands, respectively. The wetlands that would be affected by these projects are all riverine wetlands. The proposed SCVWD Stream Maintenance Program could affect approximately 100 acres of nontidal wetlands and 30 acres of tidal wetlands in Santa Clara and Pajaro River Basins. The Alviso Ring Levee affected 3.14 acres of seasonal wetlands. The projects will mitigate impacts on at least a 1:1 basis. The other projects listed in Section 6.2.1, "Projects Addressed in the Cumulative

Impact Analyses," will not affect wetlands. The Alviso Ring Levee Wetland Mitigation and Restoration Project includes the creation of 6.93 acres of seasonal wetlands and restoration of 3.14 acres of seasonal wetlands. Impacts on other waters will be temporary. The impacts of these projects will not result in significant cumulative impacts because the impacts have been or will be fully mitigated. The potential impacts of the Lower Guadalupe River Project on wetlands can only be estimated at this time. If the sediment removal alternative is selected, up to 65 acres of wetlands and an estimated 30 acres of other waters of the United States could be affected. Any impacts of the Lower Guadalupe River Project on wetlands will be analyzed in the environmental documents for that project. The cumulative impacts of the Lower Guadalupe River Project in association with other past, present, and reasonably foreseeable future projects will also be addressed. If cumulative impacts on wetlands are identified, the Lower Guadalupe River Project environmental documents will determine the appropriate mitigation.

6.2.5.4 Alviso Slough Salt Marsh and Wetlands

Cumulative impacts on salt marshes and wetlands in Alviso Slough would be due primarily to the effects of the projects listed in Section 6.2.1, "Projects Addressed in the Cumulative Impact Analyses." These projects could affect hydrologic and hydraulic conditions in Alviso Slough, as discussed in Section 6.2.2, "Cumulative Impacts on Hydrologic and Hydraulic Conditions." With the possible exception of the Lower Guadalupe River Project, these projects would have no direct construction-related effects on the salt marshes and wetlands in Alviso Slough.

The Lower Guadalupe River Project includes Alviso Slough between the Alviso UPRR Bridge and the confluence of Alviso Slough with Coyote Creek (Figure 6.1-1). In September 1999, marsh habitats and associated dominant plant species were mapped along Alviso Slough, using color infrared digital orthographic images as a base (H. T. Harvey & Associates, 1999b). The following description of biotic habitats along the length of Alviso Slough is based on this survey. It is included to assist in the evaluation of the cumulative impacts of the projects in the Guadalupe River watershed on salt marsh habitat and species in the Alviso Slough area.

Salt Marsh and Wetlands. Tidal marsh occurs along the length of Alviso Slough between the levees of the salt evaporation ponds and the slough channel. This elongate tidal marsh complex extends from the Gold Street Bridge in Alviso to the confluence of Alviso Slough and Coyote Creek, immediately adjacent to San Francisco Bay. At the time of mapping, the tidal marsh complex included three habitat types: freshwater marsh, brackish marsh, and salt marsh. The approximate boundaries of freshwater marsh, brackish marsh, and salt marsh are shown in Figure 6.2-6. The Alviso Slough benches, which contain much of the marsh habitat, are under the jurisdiction of the California State Lands Commission. The levees and salt ponds are owned and maintained by the Cargill Salt Company, with the exception of pond A6, which is owned by USFWS.

Freshwater marsh habitat occurs from the Gold Street Bridge downstream for approximately 3,300 lf. The dominant plant species of this habitat type in Alviso Slough are California bulrush (*Scirpus californicus*), tule (*Scirpus acutus*), alkali bulrush (*Scirpus maritimus*), and cattail (*Typha* sp.).

Cumulative Impacts. As discussed in Section 6.2.1.8, "Lower Guadalupe River Flood Protection Project," the Upper Guadalupe River Project and the Guadalupe River Project with Bypass System Alternative will not be made operational until the Lower Guadalupe River Project has been completed.

Between the Highway 101 bridge and the Highway 237 bridge, the channel capacity is limited to approximately 14,000 cfs, as discussed in Section 6.2.2.1, "Channel Capacity of the Guadalupe River Downstream from I-280." The channel capacity between the Highway 101 bridge and the Highway 237 bridge serves to limit the peak floodflows that can be conveyed in the lower Guadalupe River. Under existing conditions, flows greater than 14,000 cfs break out of the channel along the lower Guadalupe River upstream from the Highway 237 bridge. Downstream from the Highway 237 bridge, floodflows in the Guadalupe River are limited to 14,000 cfs. Floodflows overtop the west levee into adjacent salt evaporation ponds just downstream from the Alviso UPRR Bridge. When flows reach 14,000 cfs at the Alviso UPRR Bridge, approximately 5,500 cfs flows into the salt evaporation ponds because of low spots on the west levee, and floodflows are approximately 8,500 cfs in Alviso Slough.

Because of the channel capacity of only 14,000 cfs at the Highway 237 bridge, the slough benches just downstream from the Alviso UPRR Bridge are inundated by up to 6.5 feet (2 meters) of water, and the slough benches in the middle of Alviso Slough are inundated by approximately 3 feet (1.0 meter) of water (Figure 6.2-7).

The channel capacities in the lower Guadalupe River/Alviso Slough area will remain the same as under existing conditions until the Lower Guadalupe River Project has been completed. The lower Guadalupe River/Alviso Slough area will not experience a change in floodflow frequency, duration, or magnitude from existing conditions as a result of the cumulative effect of the flood protection projects in the Guadalupe River watershed unless the Lower Guadalupe River Project changes the channel capacity at the Highway 237 bridge (Sections 6.2.1.8," Lower Guadalupe River Flood Protection Project," and 6.2.2, "Cumulative Impacts on Hydrologic and Hydraulic Conditions").

The combined Guadalupe River Project with Bypass System Alternative and the Upper Guadalupe River Project will not result in changes to the depth, frequency, or duration of inundation of slough benches. No significant cumulative impacts on marsh habitat in Alviso Slough would occur as a result of the Guadalupe River Project with Bypass System Alternative and the Upper Guadalupe River Project prior to construction of the Lower Guadalupe River Project.

Depending on the flood protection elements constructed for the Lower Guadalupe River Project, the depth, frequency, and duration of inundation of slough benches may or may not change. The potential direct and indirect impacts of the Lower Guadalupe River Project on salt marsh habitat in Alviso Slough cannot be identified until the final design of the Lower Guadalupe River Project has been determined. It is possible that the Lower Guadalupe River Project could increase or decrease the floodflows entering Alviso Slough. It would therefore be speculative to attempt to define any potential impacts on salt marsh habitat before the final design of the Lower Guadalupe River Project has been determined. Potential impacts will be considered in the design and analyzed in the environmental review of the Lower Guadalupe River Project.

See Section 6.2.6, "Cumulative Impacts on Biological Resources – Wildlife," for a discussion of the potential cumulative impacts on salt marsh wildlife species.

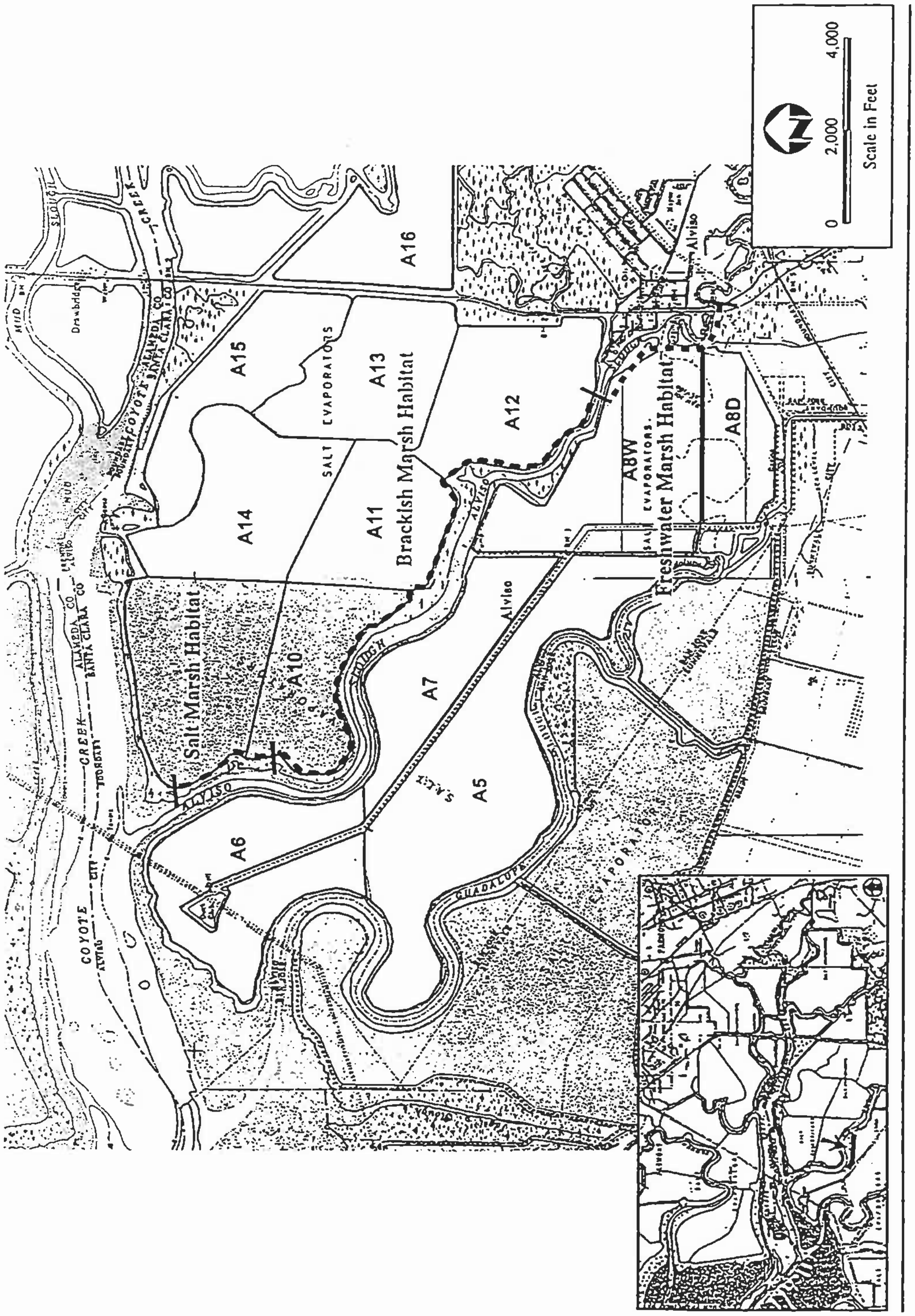
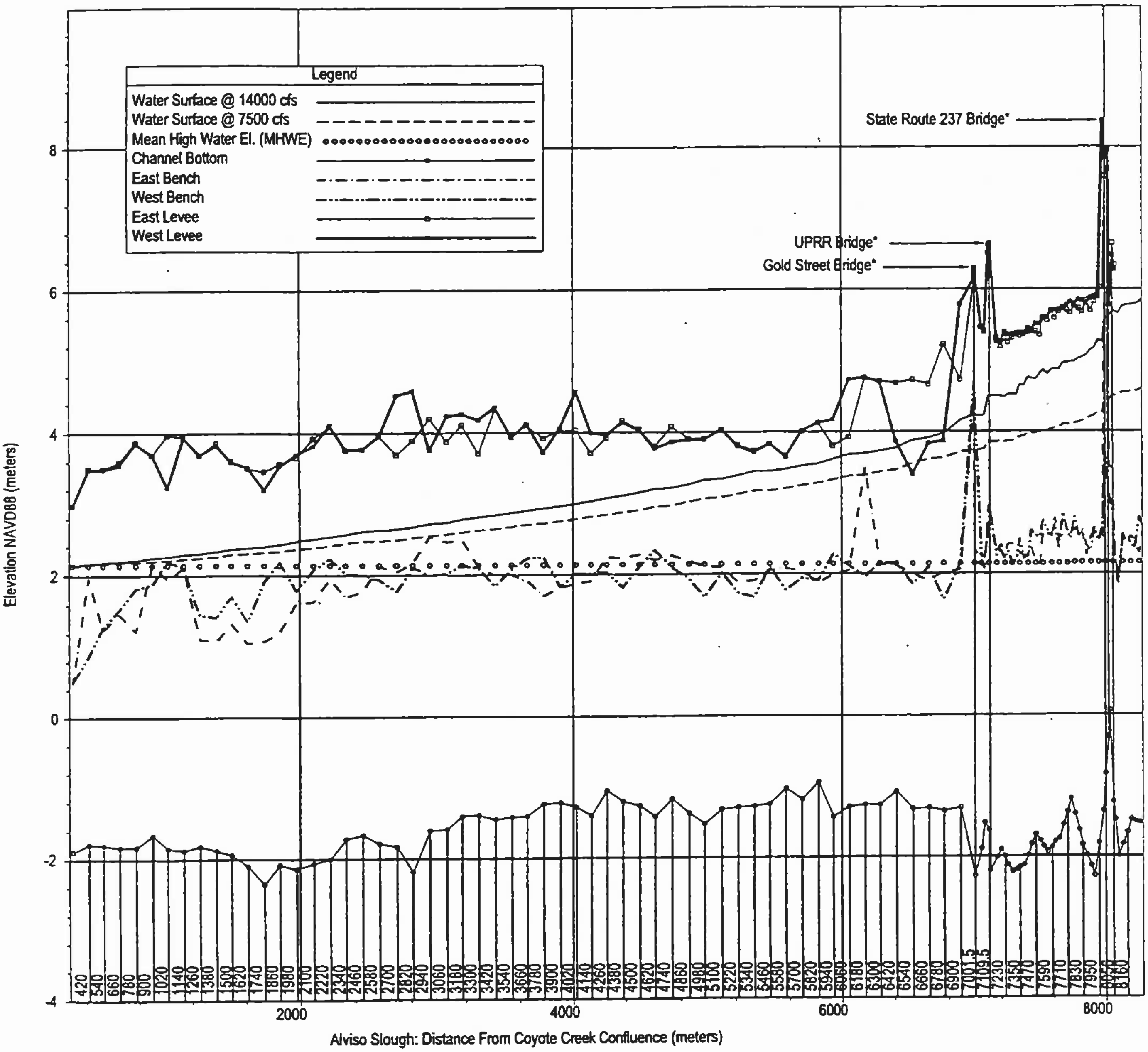


Figure 6.2-6. Tidal Marsh Habitat of Lower Guadalupe River - Alviso Slough Area



*Downstream edge of each crossing.

Figure 6.2-7. Profile of Alviso Slough: Mean High Water Elevation and Elevation of Floodflows of 7,500 cfs and 14,000 cfs

6.2.5.5 Salt Evaporation Ponds

Cumulative impacts on salt evaporation ponds adjacent to Alviso Slough would be due primarily to the effects of the projects listed in Section 6.2.1, "Projects Addressed in the Cumulative Impact Analyses." These projects could affect hydrologic and hydraulic conditions in Alviso Slough, as discussed in Section 6.2.2, "Cumulative Impacts on Hydrologic and Hydraulic Conditions." With the possible exception of the Lower Guadalupe River Project, these projects would have no direct construction-related effects on salt evaporation ponds adjacent to Alviso Slough.

Existing Salt Evaporation Pond Flooding. Under existing conditions, flows in Alviso Slough greater than approximately 6,800 cfs begin to overtop the west bank levee adjacent to Alviso (Station 6540 in Figure 6.2-7). The overtopping causes water to flow into salt evaporation pond A8W (Figure 6.2-6). The salt evaporation ponds provide habitat for the western snowy plover, a species federally listed as threatened. Under existing conditions, water flows into pond A8D from pond A8W when the depth of water in pond A8W reaches approximately 1.5 feet.

In addition, pond A8D can be flooded from high waters in Guadalupe Slough, which is located adjacent to the south and west levees of pond A8D. Guadalupe Slough is not part of the Guadalupe River watershed, and construction or operation of the Guadalupe Project with Bypass System Alternative will not affect the hydrology of Guadalupe Slough. The existing channel capacity of Guadalupe Slough ranges from 6,000 to 8,000 cfs, depending on where the levee is overtopped and on the tide elevation. Flows exceeded the capacity of Guadalupe Slough in 1998, contributing to and possibly causing most of the flooding of evaporation pond A8D.

A flow of 14,000 cfs represents the existing channel capacity of the lower Guadalupe River at the Highway 237 bridge. With a flow of 14,000 cfs at the Highway 237 bridge, pond A8W would be inundated to a depth of 6.0 feet and pond A8D would be inundated to a depth of 3.5 feet. Ponds A5 through A7 (Figure 6.2-6) would also be inundated. During past flood events, such as those in 1996 and 1998, water remained in portions of pond A8D as late as June.

Cumulative Impacts. As discussed in Section 6.2.1.8, "Lower Guadalupe River Flood Protection Project," the Upper Guadalupe River Project and the Guadalupe River Project with Bypass System Alternative will not be made operational until the Lower Guadalupe River Project has been completed.

Between the Highway 101 bridge and the Highway 237 bridge, the channel capacity is limited to approximately 14,000 cfs, as discussed in Section 6.2.2.1, "Channel Capacity of the Guadalupe River Downstream from I-280." The channel capacity between the Highway 101 bridge and the Highway 237 bridge serves to limit the peak floodflows that can be conveyed in the lower Guadalupe River. Under existing conditions, flows greater than 14,000 cfs break out of the channel along the lower Guadalupe River upstream from the Highway 237 bridge. Downstream from the Highway 237 bridge, floodflows in the Guadalupe River are limited to 14,000 cfs. Floodflows overtop the west levee into adjacent salt evaporation ponds just downstream from the Alviso UPRR Bridge. When flows reach 14,000 cfs at the Alviso

UPRR Bridge, approximately 5,500 cfs flows into the salt evaporation ponds because of low spots on the west levee, and floodflows are approximately 8,500 cfs in Alviso Slough.

The channel capacities in the lower Guadalupe River/Alviso Slough area will remain the same as under existing conditions until the Lower Guadalupe River Project has been completed. The lower Guadalupe River/Alviso Slough area will not experience a change in floodflow frequency, duration, or magnitude as a result of the cumulative effect of the flood protection projects in the Guadalupe River watershed unless the Lower Guadalupe River Project changes the channel capacity at the Highway 237 bridge (Section 6.2.1.8, "Lower Guadalupe River Flood Protection Project," and Section 6.2.2, "Cumulative Impacts on Hydrologic and Hydraulic Conditions").

The combined Guadalupe River Project with Bypass System Alternative and the Upper Guadalupe River Project will not result in changes to the depth, frequency, or duration of flooding of salt evaporation ponds. No significant cumulative impacts on salt evaporation ponds would occur as a result of the Guadalupe River Project with Bypass System Alternative and the Upper Guadalupe River Project prior to construction of the Lower Guadalupe River Project.

Depending on the flood protection elements constructed for the Lower Guadalupe River Project, the depth, frequency, and duration of inundation of salt evaporation ponds may or may not change. The potential direct and indirect impacts of the Lower Guadalupe River Project on salt evaporation ponds cannot be identified until the final design of the Lower Guadalupe River Project has been determined. It is possible that the Lower Guadalupe River Project could increase or decrease the floodflows entering Alviso Slough. It would therefore be speculative to define any potential impacts on the salt evaporation ponds before the final design of the Lower Guadalupe River Project has been determined. Potential impacts will be considered in the design and analyzed in the environmental review of the Lower Guadalupe River Project.

See Section 6.2.6, "Cumulative Impacts on Biological Resources – Wildlife," for a discussion of the potential cumulative impacts of changes in the inundation of salt evaporation ponds on the snowy plover.

6.2.6 Cumulative Impacts on Biological Resources – Wildlife

6.2.6.1 Overview of Disturbance Resulting from Human Activities

Implementation of projects in the Guadalupe River watershed would result in substantial long-term increases in human activity along the Guadalupe River riparian corridor. In addition, SCVWD has a policy governing joint public use of SCVWD facilities (Santa Clara Valley Water District, Resolution No. 74-38) that would allow future park projects to use floodway-maintenance roads as trails. After construction of the projects has been completed, increased human activities would include recreational uses, revegetation monitoring, and floodway-maintenance work (Appendix 7, "Recreation Plan"). These activities could cause increased disturbance of wildlife compared to current levels, especially during the spring breeding season for birds.

This cumulative impact would be greater than the sum of the impacts of each project separately because the impacts would occur close together both in time and space. Wildlife would therefore have more difficulty avoiding or tolerating disturbances. The contribution to wildlife disturbance of the Guadalupe River Project with Bypass System Alternative and the Guadalupe River Park Project would be minimized by implementing the environmental commitments of the Proposed Project: the vegetation protection plan, planting riparian and SRA cover vegetation, and protecting the compensatory mitigation sites (Section 3.4.3, "Environmental Commitments"). The Upper Guadalupe River Project and the Guadalupe Creek Restoration Project would also include similar measures to minimize the impacts of recreational use on mitigation sites. The other projects listed in Section 6.2.1, "Projects Addressed in the Cumulative Impact Analysis," with the possible exception of the Boston Property Project, discussed below, would not result in long-term increases in human activity in the Guadalupe River riparian corridor. The Lower Guadalupe River Project has not yet developed specific plans for accommodating recreational use, but it is expected that measures similar to those described above will be incorporated into the project design. The cumulative impact of disturbance to wildlife resulting from human activities, due to the projects discussed above, is considered less than significant because wildlife in the affected areas are already subjected to substantial disturbance from recreational use and urban activities adjacent to the project areas and because urban and recreational disturbances would increase even in the absence of the major projects listed in Section 6.2.1, "Projects Addressed in the Cumulative Impact Analysis." In addition, the recreational trails will help to concentrate recreational use in specific corridors that are outside wildlife habitat areas. Therefore, no mitigation is required.

The Boston Property Project proposes three buildings that would be set back from the edge of the existing riparian corridor and riverwalk trail along the Guadalupe River by as much as 70 feet in some areas and 5 to 25 feet in other areas. The café elements would be 0 to 15 feet from the riparian corridor. The project would likely result in increased human disturbance of the riparian corridor. The buildings, depending on their design and lighting, could result in an increase in bird injury or death caused by collisions with windows. The proposed project could result in decreased value of the adjacent riparian corridor to wildlife, particularly birds (Stephens, pers. comm.).

An addendum to the Downtown Strategic Plan Programmatic EIR that addresses the proposed Boston Property Project is expected to be completed in late 2000. The addendum to the Downtown Strategic Plan Programmatic EIR must address the potential for impacts on wildlife using the riparian corridor and the SRA cover vegetation proposed as mitigation for the Guadalupe River Project with Bypass System Alternative and either avoid or fully mitigate those impacts. The project proponents of the Boston Property Project must coordinate with the Corps and SCVWD regarding their proposed design and the potential effect on the SRA cover vegetation proposed as mitigation for the Guadalupe River Project with Bypass System Alternative.

6.2.6.2 California Red-Legged Frog

The California red-legged frog is federally listed as threatened and is a State species of special concern. As indicated in Section 5.5, "Biological Resources – Wildlife," red-legged frogs have not been observed in the Guadalupe River system below Almaden Lake and the Guadalupe River does not provide suitable habitat for the red-legged frog. The Guadalupe River Project with Bypass System Alternative and the projects described in Section 6.2.1, "Projects Addressed in the Cumulative Impact Analyses," would not affect the red-legged frog or habitat critical to its continued existence because the red-legged frog does not occur in areas affected by the projects. No indirect or cumulative impacts are expected as a result of the incremental impacts of the Bypass System Alternative.

6.2.6.3 Western Snowy Plover

The western snowy plover is federally listed as threatened and is a State species of special concern. Snowy plover populations have declined as a result of loss of nesting habitat, human disturbance at nesting sites, and predation. The snowy plover is a small shorebird about 6.25 inches in length. The coastal population of the western snowy plover occurs along the California coast and in its bays, and the species is a year-round resident in the San Francisco Bay area. Its breeding season is from mid-March through July, with peaks observed from early May through late June.

Habitat Requirements. The snowy plover has historically nested primarily on sandy coastal beaches and on the margins of alkali lakes and playas in inland areas. It is not known whether this species nested in San Francisco Bay before the conversion of salt marsh to salt evaporation ponds. However, these ponds have provided suitable nesting and foraging habitat since the beginning of the 20th century (Grinnell et al., 1918), and currently about 10 percent of the California population of snowy plovers breeds in San Francisco Bay salt ponds, mostly in the southern part of the bay (Page and Stenzel, 1981, Page et al., 1991). Critical habitat was proposed for the snowy plover on December 7, 1999; 19 areas along the coast were proposed as critical-habitat areas. No critical habitat was proposed for Santa Clara County, where the project will be constructed.

Occurrence in the Guadalupe River Watershed. Snowy plovers were recorded nesting on salt pond levees in Alviso as early as 1947 (Audubon Society, 1947). By this time, the snowy plover was probably well established as a breeder in the Alviso area. Breeding was confirmed there nearly every year during the 1950s (Audubon Field Notes 5:273, 10:359, 11:374, 13:451, Sibley, 1952), with a maximum of 14 nests found in 1955 (Smith, 1955). In 1971, Gill (1972) found nesting snowy plovers on the Knapp Gun Club property at the northern end of ponds A5 and A6 near the mouth of Alviso Slough (Figure 6.2-8). Page and Stenzel (1979) recorded snowy plovers in each of the three salt evaporation ponds bordering the south side of Alviso Slough (ponds A6, A7, and A8; Figure 6.2-8). They found a nest in pond A6, a brood on a levee bordering A7, and a single individual in A8.

Most recent information on snowy plover distribution along Alviso Slough has been compiled from incidental observations made by the San Francisco Bay Bird Observatory (SFBBO) during surveys of colonial waterbirds that were using the salt evaporation ponds along the slough (Ryan and Parkin, 1998). These survey data were collected only from levees; without standardized survey protocols; and, in some cases, without using a spotting scope. Using the data therefore represent a minimum estimate of the actual number of snowy plovers using the ponds. Snowy plovers have recently been recorded and confirmed to be nesting in two of the three salt evaporation ponds bordering the southern side of Alviso Slough (A6 and A8). In pond A6, at the lower end of Alviso Slough, the SFBBO detected snowy plovers during every year in which surveys were conducted between 1986 and 1994. As many as 18 individuals were observed in a single year; the average observation rate was 4 individuals per survey. Breeding was confirmed in lower Alviso Slough in 5 of the 9 survey years, with a peak count of two nests on May 14, 1994. Although the SFBBO has

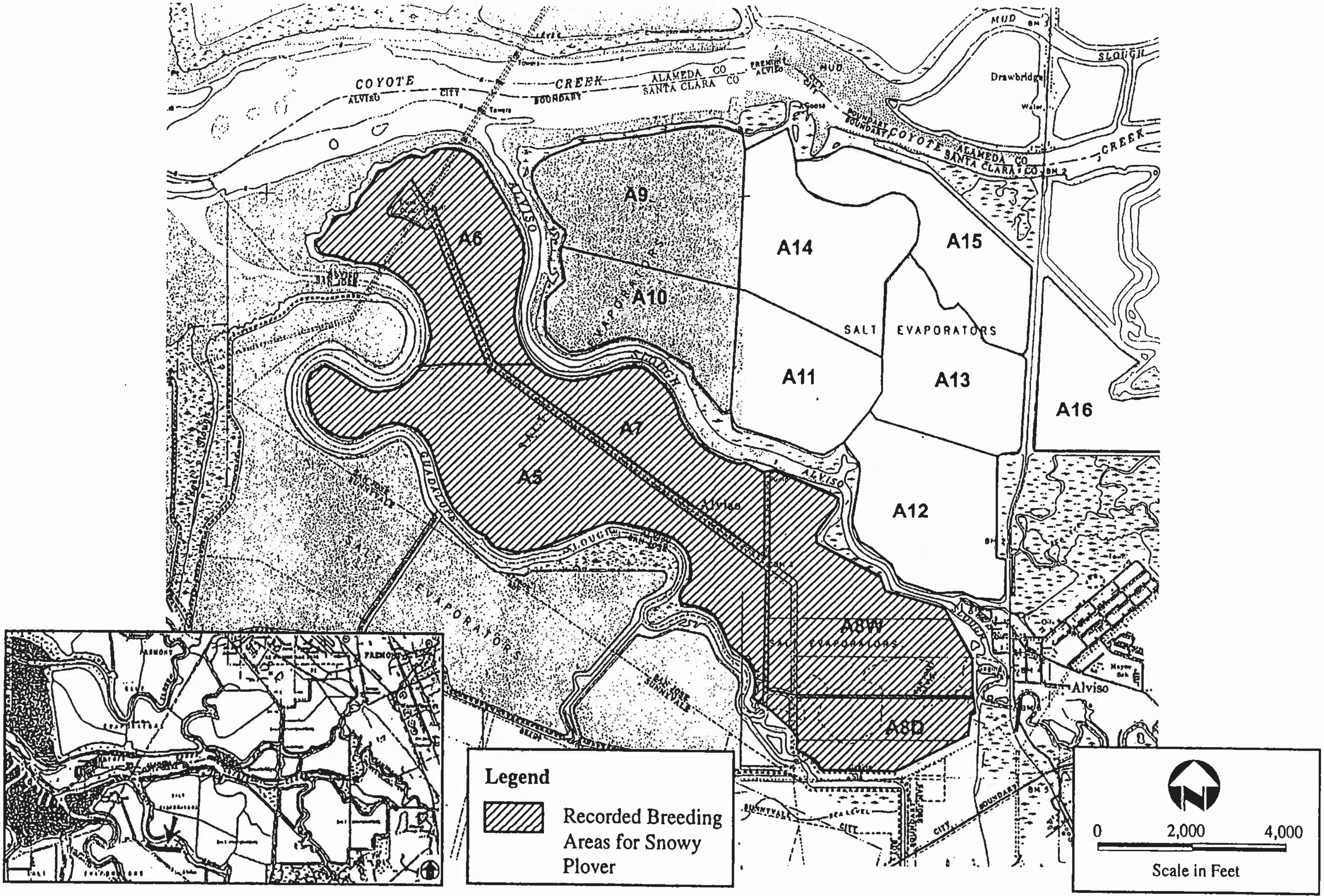


Figure 6.2-8. Recorded Breeding Areas for Western Snowy Plover - Lower Guadalupe River/Alviso Slough Area

not recorded snowy plovers in pond A7, numerous sightings and confirmed nestings have been documented in pond A8, located south and west of the uppermost reaches of Alviso Slough. Here, between 1981 and 1997, snowy plovers were recorded in 11 of the 13 years in which the SFBBO conducted surveys. The maximum number observed was 20 adults in a single survey, and the average was 9.4 adult observations. Breeding was confirmed during 9 different years, with a maximum of 19 active nests on July 3, 1996. The vast majority of snowy plover activity in pond A8 was at the southern end of the pond, which is mostly dry during the breeding season in most years.

Incidental observations on pond A8 made by bird watchers – most of whom were viewing from the observation platform south of San Tomas Aquino Creek – and other incidental observations complement the SFBBO's data. On June 4, 1989, a year in which the SFBBO did not conduct breeding-season surveys at these ponds, a brood of snowy plover chicks was seen at the west end of pond A8 (Mammoser, pers. comm.). On June 4, 1993, a year in which the SFBBO conducted no surveys of the salt evaporation ponds, at least nine snowy plovers were seen in the south-central portion of pond A8 (Rottenborn, pers. comm.). Although breeding was not confirmed by the SFBBO or others in 1997, bird watchers observed one or two adult snowy plovers in pond A8 on four dates between April 8 and August 13 of that year. On May 13, 1998, an H. T. Harvey & Associates ornithologist observed 19 adults and 3 active nests at the south end of pond A8; in 1998, standing water was present in pond A8D until June. In 1999, protocol-level snowy plover surveys conducted by H. T. Harvey & Associates detected as many as 10 adults and 1 nest (H. T. Harvey & Associates, 1999a) (Figure 6.2-9). SCVWD recorded snowy plovers on 7 of 16 surveys conducted from March to July 1999, with a high of 18 observed on March 12, 1999 (Padley, pers. comm.). Snowy plovers have occasionally been recorded foraging in the diked ponds on the northeast side of Alviso Slough (ponds A9–A12) by bird watchers. However, ponds A10, A11, and A12 usually contain water all year, and water in pond A9 generally does not begin to recede until late summer. As a result, snowy plovers probably do not nest in or around these ponds or they do so only sporadically and in small numbers. Past surveys of snowy plovers in the southern San Francisco Bay area (Gill, 1972, Page and Stenzel, 1979) failed to find nesting snowy plovers in these ponds. The only recent nesting records in the vicinity of these ponds indicate that one or two pairs have nested in some years in a small impoundment between pond A12 and the railroad tracks, north of the Alviso marina and well removed from Alviso Slough (Rogers, pers. comm., Mammoser, pers. comm.).

Cumulative Impacts. As discussed in Section 6.2.5.5, "Salt Evaporation Ponds," the combined Guadalupe River Project with Bypass System Alternative and Upper Guadalupe River Project will not result in impacts on salt evaporation ponds. Therefore, no significant cumulative impacts on the western snowy plover or snowy plover habitat would occur as a result of the Guadalupe River Project with Bypass System Alternative and the Upper Guadalupe River Project.

Depending on the flood protection elements constructed for the Lower Guadalupe River Project, the depth, frequency, and duration of inundation of salt evaporation ponds as a result of floodflows may or may not change. Some adverse cumulative impacts on the western snowy plover may result if there are increases in the depth, frequency, and duration of inundation of salt evaporation ponds used by this species. The potential impacts of the Lower Guadalupe River Project on western snowy plover cannot be identified until

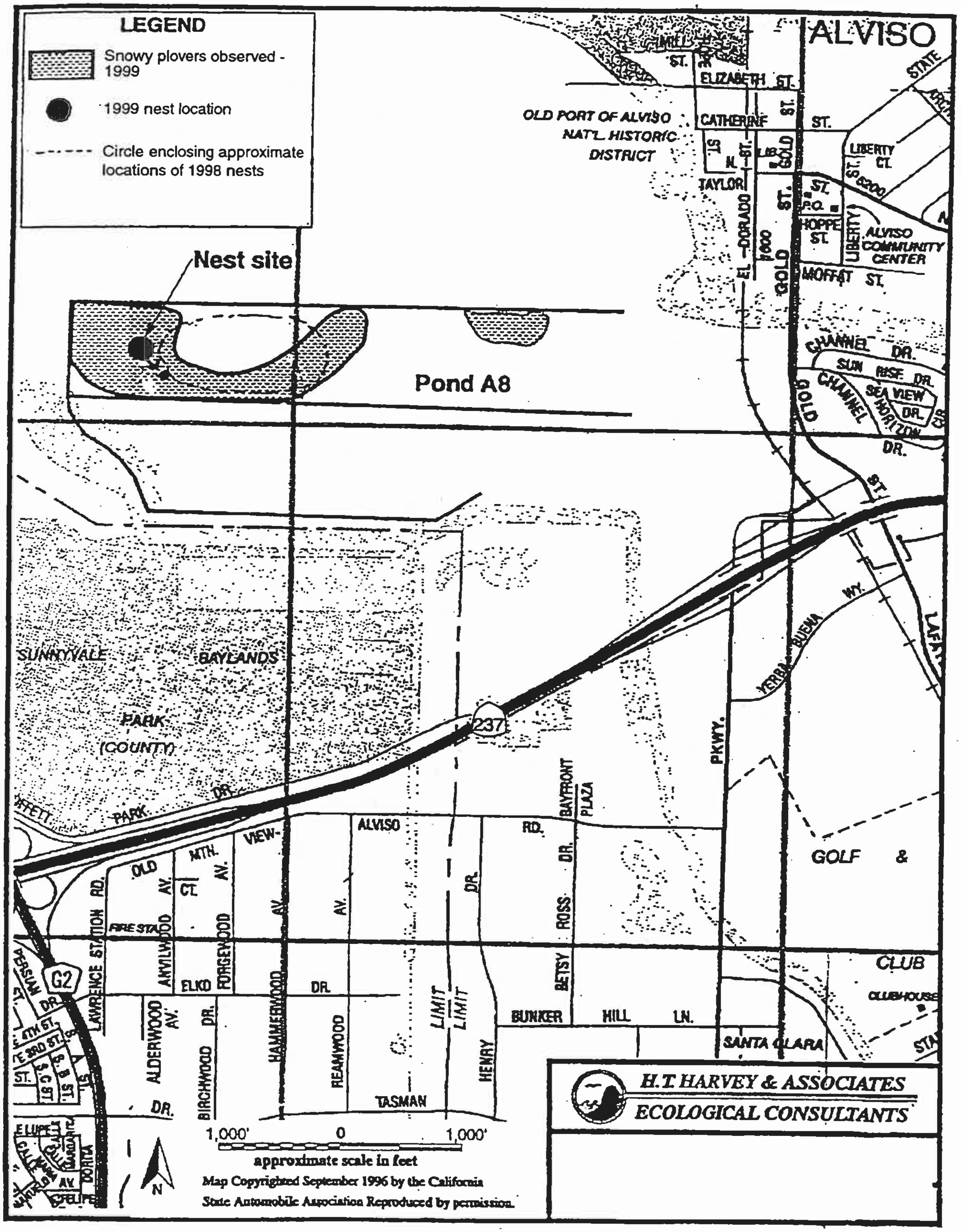


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Figure 6.2-9. Western Snowy Plover Nest Sites - 1998 and 1999

the final design of the Lower Guadalupe River Project has been determined. If, for example, the Lower Guadalupe River Project includes a change in the 14,000 cfs capacity limitation at the Highway 237 bridge, levees are not raised, and there is no pumping of flood-waters from pond A8D, then the depth and duration of inundation of salt evaporation ponds from floodflows could increase beyond existing conditions. These changes could result in an adverse impact on the available nesting habitat for snowy plover within the salt evaporation ponds. However, it would be speculative to define potential impacts on the snowy plover before the final design of the Lower Guadalupe River Project has been determined.

Potential impacts will be considered in the design and analyzed in the environmental review of the Lower Guadalupe River Project.

If a cumulative impact on the western snowy plover or its habitat, as a result of changes in hydrologic or hydraulic conditions due to the flood protection project, is identified in the BA for the Lower Guadalupe River Project, USFWS has requested that an analysis determine for the decision makers what portion of this cumulative impact, if any, is caused by the Guadalupe River Project with Bypass System Alternative. If some portion of an unexpected cumulative impact is shown to be a result of the Guadalupe River Project with Bypass System Alternative, the Corps, Sacramento District, will reinitiate consultation with USFWS on the Guadalupe River Project. In such a case, Corps policy and regulations exist that allow for additional mitigation to compensate for impacts proven to be a result of a completed project.

If a cumulative hydrologic or hydraulic impact were to be identified in the BA for the Lower Guadalupe River Project, events and actions would probably occur in the following sequence:

1. Following a BO rendered for the Lower Guadalupe River Project in which a cumulative impact is linked to the completed Guadalupe River Project with Bypass System Alternative, the Corps and SCVWD would review the findings of USFWS.
2. If the Corps and SCVWD concur with the findings of the BO, they would review mitigation needs and determine whether the costs of mitigation appear to be a normal part of the operation and maintenance requirements of the Guadalupe River Project with Bypass System Alternative or if such costs appear to be extraordinary and warrant Federal cost participation. If the costs are an operation and maintenance responsibility, SCVWD would be responsible for them. If the costs appear to warrant Federal participation, the Corps and SCVWD would prepare an authorization post change report to document the need and costs for mitigating that portion of the cumulative impact determined to be a result of the Guadalupe River Project with Bypass System Alternative.
3. The postauthorization change report would be submitted to the Chief of Engineers (if the changes to the project are modest) or to Congress (if the changes are substantial) for authorization of its recommendations.
4. After authorization, the Corps and SCVWD would jointly carry out the authorized mitigation.
5. Additional NEPA/CEQA documentation would be prepared as required.

Conservation Measures. No change in flood frequency or adverse impacts on western snowy plover habitat are expected to result from the Guadalupe River Project with Bypass System Alternative or the cumulative effects of the Guadalupe River Project with Bypass System Alternative and the Upper Guadalupe River Project. However, as a stipulation for issuing the BO on the Guadalupe River Project with Bypass System Alternative, USFWS has requested that the Corps and SCVWD ensure that floodwaters will be pumped out of salt evaporation pond A8D between January and May. Pumping will occur after flooding or when USFWS determines that snowy plover nests are at risk from inundation. The Corps and SCVWD have committed to coordinate with Cargill Corporation, the owner of the salt evaporation ponds, regarding these measures.

In addition, USFWS has requested that the Corps and SCVWD monitor floodflows and surface-water levels in Alviso Slough and in evaporation pond A8D. The purpose of the monitoring program is to verify whether the flood frequency or inundation period within pond A8D remains unchanged as a result of the construction of the Guadalupe River Project prior to coordination with USFWS in accordance with the Endangered Species Act and the Fish and Wildlife Act on the Lower Guadalupe River Project.

The Corps and SCVWD will ensure that a short-term habitat-monitoring program begins in 2001 and continues through the remaining construction phases of the Guadalupe River Project with Bypass System Alternative. Proposed short-term monitoring methods are outlined below and described in the MMP (Appendix 3); final short-term monitoring methods for the salt evaporation ponds will be developed in coordination with USFWS. Monitoring reports will be submitted to USFWS. Short-term monitoring will end when the Lower Guadalupe River Project has been completed and the Guadalupe River Project with Bypass System Alternative becomes operational. After the short-term monitoring is completed, water level monitoring may continue as a component of the Lower Guadalupe River Project MMP. This monitoring will depend on the results of consultation with USFWS on the Lower Guadalupe River Project. As described below, the short-term monitoring program for the western snowy plover will focus on flooding and surface-water level in Alviso Slough and in evaporation ponds.

Proposed Monitoring of Hydrologic Conditions in Alviso Slough Area. Streamflow in Alviso Slough can directly affect the depth and duration of flooding of the salt evaporation ponds. Changes in the depth and duration of flooding can affect the availability of the salt evaporation ponds for foraging and nesting by the snowy plover. Flooding of the salt evaporation ponds from other sources, however, such as Guadalupe Slough, is not related to the operation of the Guadalupe River Project.

Measurable Objectives. The average monthly depth and duration of flooding of salt evaporation pond A8 will not exceed that predicted by the HEC-RAS model of Alviso Slough using existing Guadalupe River streamflow data.

Monitoring Methods. Continuous surface-water level data will be collected in Alviso Slough at two locations: the Gold Street Bridge and midway between the Gold Street Bridge and the confluence of Alviso Slough with Coyote Creek. Continuous surface-water level data will also be collected in Guadalupe Slough adjacent to evaporation pond A8D; these data are critical to assisting in isolating the impacts of construction and operation of the Guadalupe River Project. In addition, flow rates will be measured continuously at the Gold

Street Bridge and Guadalupe Slough locations. The continuous recorders will include a vented pressure sensor and will collect data once every 10 minutes. A peak-stage recorder, which records the peak of the flood, will be placed at the crest of the weir on the levee between Alviso Slough and evaporation pond A8W. This site is the historical location of levee overtopping. Peak-stage recorders will also be placed in evaporation ponds A8W and A8D to track the depth of flooding. The Corps and SCVWD have committed to coordinate with Cargill regarding these measures.

The locations of each continuous recorder and peak-stage recorder will be surveyed and referenced to a stable benchmark and to each other. The continuous recorders and peak-stage recorders will be located using an existing horizontal datum and will be programmed to record water-surface elevation in feet relative to the National Geodetic Vertical Datum of 1929. Data will be downloaded from the continuous recorders once every 60 days. Data will be downloaded from the peak-stage recorders after each storm. The elevations of the continuous recorders and peak-stage recorders will be checked at the close of each year's data period relative to the benchmark and to each other. The entire length of the levee between evaporation ponds A8W and A8D will be surveyed to verify low spots. It is assumed that water depth and a description of operations in salt evaporation ponds A5 through A8 will be provided twice a year by Cargill to identify the operational baseline.

The depth and duration of flooding of the salt evaporation ponds will be determined by field observations, the analysis of the continuous water-level and flow data, and the analysis of the peak-stage data.

Remedial Actions. If the median monthly depth and duration of flooding of salt evaporation pond A8 plus or minus one standard deviation about the mean, exceed those predicted by the HEC-RAS model of Alviso Slough, the Corps and SCVWD will coordinate with USFWS to determine the cause of the change in depth and duration of flooding and whether additional steps are required to minimize impacts on western snowy plover. The Corps, in coordination with USFWS, will reinitiate consultation if changes in hydraulic conditions continue, if they affect listed species, and if they are determined to be a result of the Guadalupe River Project with Bypass System Alternative.

6.2.6.4 California Clapper Rail

The California clapper rail is federally listed as endangered and State listed as threatened. Loss and fragmentation of coastal and bay wetlands have contributed to the decline of this species. Very high tides have caused nesting failure and have increased the likelihood of predation. The California clapper rail is a marsh bird with a short tail and short, rounded wings. It is about 14.5 inches in length. The California clapper rail is a year-round resident in the San Francisco Bay area, where it breeds in salt and brackish marshes along the edge of San Francisco Bay. It is absent from or occurs only sporadically, mostly during the nonbreeding season, in historical breeding areas elsewhere on the central California coast. Its breeding season is from mid-March through July, with peaks observed from early May through late June.

Habitat Requirements. California clapper rails are most abundant in extensive salt marshes dominated by California cordgrass, pickleweed, and marsh gumplant (*Grindelia stricta*) where numerous secondary tidal channels are present (Harvey, 1980). Nests are placed in or under cordgrass, gumplant, pickleweed, salt grass, or tidal wrack (De Groot, 1927, Evens and Page, 1983, Harvey, 1980, Foerster et al., 1990). Most foraging occurs on exposed mud or in vegetation along the margins of tidal channels; secondary tidal channels are used the most frequently (Shuford, 1993). In winter, clapper rails forage primarily in cordgrass-dominated habitat in the lower marsh (Shuford, 1993), although tall vegetation at the edges of the upper marsh provides important cover during high winter tides. California clapper rails also breed in brackish marshes, especially those dominated by alkali bulrush (*Scirpus robustus*). However, the importance of these marshes to clapper rail populations is not well understood (H. T. Harvey & Associates 1989, 1990b, 1991a, 1991b, Collins et al., 1994).

Occurrence in the Guadalupe River Watershed. Breeding-season surveys of south San Francisco Bay marshes by Gill (1979) found clapper rails in salt marshes west of Drawbridge, which is immediately north of Coyote Slough. Gill found no clapper rails, however, in the more brackish marshes to the east, although clapper rails had been recorded in these brackish marshes during winter. Intensive surveys by H. T. Harvey & Associates (1989) also detected no clapper rails in the brackish marshes east of Drawbridge during the 1989 breeding season. These surveys found clapper rails west of Drawbridge to be associated more strongly with cordgrass-dominated habitats than with alkali bulrush, but also documented breeding clapper rails in a wide variety of plant associations. Surveys of the same areas in winter 1989–90 and during the breeding season of 1990 found a number of clapper rails occupying several brackish, bulrush-dominated marshes located well to the east of Drawbridge (H. T. Harvey & Associates, 1990a, 1990b). In addition, clapper rails were found in nearly pure stands of alkali bulrush along Guadalupe Slough in 1990 and 1991 (H. T. Harvey & Associates, 1991a, 1991b).

Few surveys for clapper rails have been conducted specifically in Alviso Slough. Most surveys for this species in the southern San Francisco Bay area, like those conducted by Harvey (1980), Moss (1980), and Foerster et al. (1990), have focused on more expansive marshes. Nevertheless, several surveys have documented clapper rails along Alviso Slough. In the early 1970s, Gill (1979) recorded clapper rails along the larger marshes fringing Guadalupe and Alviso Sloughs. Surveys of a number of south San Francisco Bay locations by H. T. Harvey & Associates (1989) included breeding-season surveys in a 26-acre section of transitional salt-brackish marsh along Alviso Slough, approximately 2 miles upstream from the mouth of the slough. Five clapper rails found there included one pair using a narrow strip of pure cordgrass along the main slough, another pair using a mixture of cordgrass and alkali bulrush, and a single individual in a pure stand of alkali bulrush (Figure 6.2-10). Two pairs were found occupying the same marsh in spring 1990 (H. T. Harvey & Associates, 1990b)(Figure 6.2-10). Winter surveys by Harvey (1980) found no clapper rails in the bulrush-dominated habitat along upper Alviso Slough but did detect two individuals in mixed cordgrass-pickleweed salt marsh approximately 1.6 miles downstream from the Alviso marina. Annual clapper-rail surveys conducted each winter by the San Francisco Bay National Wildlife Refuge typically omit most of Alviso Slough, although these surveys did detect one individual approximately 1.7 miles downstream from the Alviso marina on December 10, 1993, and three individuals at the mouth of the slough on January 1, 1995 (J. Albertson, pers. comm.).

Few clapper rails have been recorded along the extreme upper reaches of Alviso Slough, between Gold Street and the vicinity of the Alviso marina. In these areas, both plant

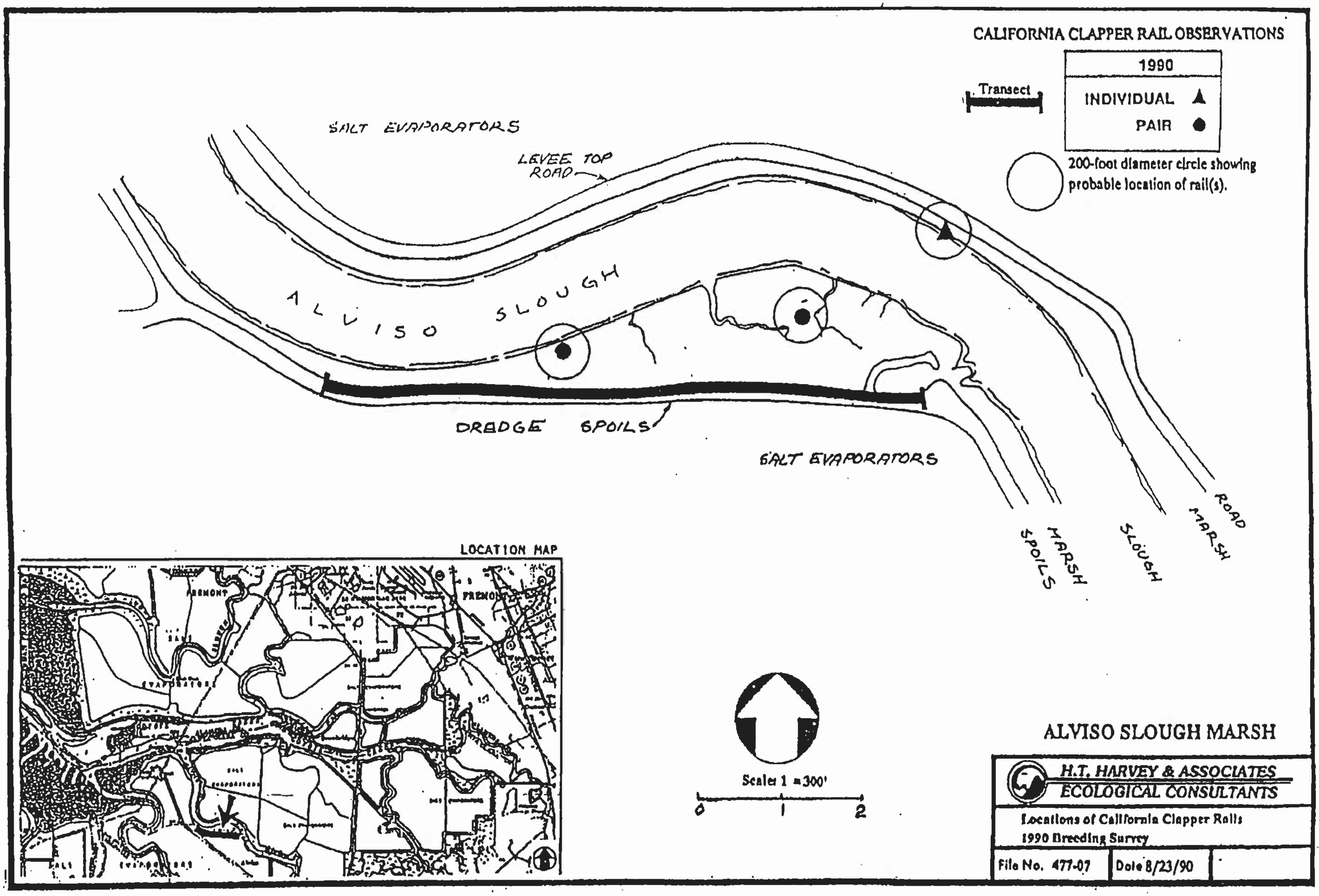

Figure 6.2-10. California Clapper Rail Survey Results -1990

associations and interstitial salinity measurements are typical of freshwater, rather than brackish, systems (H. T. Harvey & Associates, 1999b). From 1989 to 1998, summer and fall botulism surveys conducted semiannually along Alviso Slough near the Alviso marina by the SFBBO produced only one clapper rail record (October 1, 1997) during a total of 166 surveys (San Francisco Bay Bird Observatory, unpublished reports). A single individual was heard by an H. T. Harvey & Associates ornithologist immediately below the Gold Street Bridge in Alviso during spring 1997; this finding represents the uppermost record along Alviso Slough. Habitat along much of middle and lower Alviso Slough is of moderate to low quality for breeding clapper rails. SCVWD conducted winter surveys in 1996 and 1997 for clapper rails from Highway 237 to Alviso Slough. No clapper rails were recorded (Padley, pers. comm.).

Cumulative Impacts. As discussed in Section 6.2.5.4, "Salt Marsh and Wetlands – Alviso Slough," the combined Guadalupe River Project with Bypass System Alternative and Upper Guadalupe River Project will not result in impacts on wetlands in Alviso Slough. Therefore, no significant cumulative impacts on the clapper rail or clapper rail habitat would occur as a result of the Guadalupe River Project with Bypass System Alternative and the Upper Guadalupe River Project.

Depending on the flood protection elements constructed for the Lower Guadalupe River Project, the depth, frequency, and duration of inundation of marsh habitat in Alviso Slough due to floodflows may or may not change. Some adverse cumulative impacts may result if there are increases in the depth, frequency, and duration of inundation of marsh habitat in Alviso Slough used by the clapper rail. The potential impacts of the Lower Guadalupe River Project on California clapper rail cannot be identified until the final design of the Lower Guadalupe River Project has been determined. If, for example, the Lower Guadalupe River Project includes a change in the 14,000 cfs capacity limitation at the Highway 237 bridge and levees are not raised or a flood bypass is not provided, then the depth and duration of inundation of slough benches from floodflows could increase beyond existing conditions. These changes could result in an adverse impact on the marsh habitat in Alviso Slough used by the clapper rail for nesting and foraging. However, it would be speculative to define any potential impact on marsh habitat before the final design of the Lower Guadalupe River Project has been determined. Potential impacts on marsh habitat will be considered in the design and analyzed in the environmental review of the Lower Guadalupe River Project.

If a cumulative impact on the clapper rail or its habitat, as a result of changes in hydrologic or hydraulic conditions due to the flood protection projects, is identified in the BA for the Lower Guadalupe River Project, USFWS has requested that an analysis determine for the decision makers what portion of this cumulative impact, if any, is caused by the Guadalupe River Project with Bypass System Alternative. If some portion of an unexpected cumulative impact is shown to be a result of the Guadalupe River Project with Bypass System Alternative, the Corps, Sacramento District, will reinitiate consultation with USFWS on the Guadalupe River Project. In such a case, Corps policy and regulations exist that can allow for additional mitigation to compensate for impacts proven to be a result of a completed project.

If a cumulative hydrologic or hydraulic impact were to be identified in the BA for the Lower Guadalupe River Project, events and actions would probably occur in the following sequence:

1. Following a BO rendered for the Lower Guadalupe River Project in which a cumulative impact is linked to the completed Guadalupe River Project with Bypass System Alternative, the Corps and SCVWD would review the findings of USFWS.
2. If the Corps and SCVWD concur with the findings of the BO, they would review mitigation needs and determine whether the costs of mitigation appear to be a normal part of the operation and maintenance requirements of the Guadalupe River Project with Bypass System Alternative or if such costs appear to be extraordinary and warrant Federal cost participation. If the costs are an operation and maintenance responsibility, SCVWD would be responsible for them. If the costs appear to warrant Federal participation, the Corps and SCVWD would prepare a postauthorization change report to document the need and costs for mitigating that portion of the cumulative impact determined to be a result of the Guadalupe River Project with Bypass System Alternative.
3. The postauthorization change report would be submitted to the Chief of Engineers (if the changes to the project are modest) or to Congress (if the changes are substantial) for authorization of its recommendations.
4. After authorization, the Corps and SCVWD would jointly carry out the authorized mitigation.
5. Additional NEPA/CEQA documentation would be prepared as required.

Conservation Measures. No change in flood frequency or adverse impacts on California clapper rail habitat are expected to result from the Guadalupe River Project with Bypass System Alternative or the cumulative effects of the Guadalupe River Project with Bypass System Alternative and the Upper Guadalupe River Project.

However, as a stipulation for issuing the BO on the Guadalupe River Project with Bypass System Alternative, USFWS has requested that the Corps and SCVWD monitor clapper rail habitat in the Alviso Slough area. The purpose of the monitoring program is to add to baseline data and to determine whether the habitat in the salt marsh changes as a result of construction of the Guadalupe River Project with Bypass System Alternative prior to coordination with USFWS in accordance with the Endangered Species Act and the Fish and Wildlife Coordination Act on the Lower Guadalupe River Project. Available information indicates that the dominant plant associations in the tidal marsh habitat along Alviso Slough vary with the type of water year (dry or wet). Habitat in and adjacent to Alviso Slough has been monitored for more than 10 years (H. T. Harvey & Associates, 1999b). The data from this monitoring will provide a baseline for identifying habitat changes.

The Corps and SCVWD will ensure that a short-term habitat-monitoring program will begin in 2001 and continue through the remaining construction phases of the Guadalupe River Project with Bypass System Alternative. Proposed short-term monitoring methods are outlined below and described in the MMP (Appendix 3). Final short-term monitoring methods for the Alviso Slough area will be developed in coordination with USFWS, and monitoring reports will be submitted to USFWS. Short-term monitoring will end after the Lower Guadalupe River Project has been completed and the Guadalupe River Project with Bypass System Alternative is operational. After short-term monitoring has been completed, monitoring of clapper rail habitat in the Alviso Slough area may continue as a component of the Lower Guadalupe River Project MMP, depending on the results of consultation with USFWS on the Lower Guadalupe River Project.

The proposed short-term clapper rail monitoring program will focus on the following key habitat indicators for the clapper rail:

- Dominant plant species and habitat types in Alviso Slough
- Floodflows, surface-water levels, and salinity in Alviso Slough

Proposed Monitoring of Dominant Plant Species and Habitat Types in Alviso Slough. Changes in the dominant plant species and marsh habitat types in Alviso Slough can directly affect habitat for the California clapper rail and salt marsh harvest mouse. A significant loss of salt marsh habitat can negatively affect the clapper rail and salt marsh harvest mouse.

Measurable Objective. The rate of conversion of salt marsh to other habitat types as a result of the construction of the Guadalupe River Project with Bypass System Alternative must not exceed the average annual rate of conversion during the past 10 years (1989 to 1999).

Monitoring Methods. The following is a summary of monitoring methods; see the MMP (Appendix 3) for a more detailed discussion of methodology. Color infrared aerial photographs will be taken annually of Alviso Slough from the Alviso UPRR Bridge to the confluence with Coyote Creek. Photographs will be taken from an altitude of approximately 8,500 feet (1.6 miles) using a 6-inch (15.2-centimeter) camera lens. The flight to obtain the aerial photographs will be scheduled between June 15 and July 31 during negative tidal elevation and 30- to 45-degree solar altitude.

Field surveys and analysis of vegetation in Alviso Slough will include mapping of plant associations. Topographic features, marsh boundaries, and tentative vegetation associations, based on color signatures, will be mapped prior to ground truthing. Plant associations will be summarized by dominant-species categories. For example, the alkali bulrush peppergrass association is an alkali-bulrush dominant-species category. These dominant-species categories will then be assigned to one of four habitat types: salt marsh, brackish marsh, freshwater marsh, or upland. The field vegetation maps (acetate overlays) will be scanned and electronically digitized. Plant-association acreages and color-coded figures will be generated in a GIS. Area comparisons between dominant-species categories and habitat types between study years will be made. Areas of significant change will be determined and presented as a habitat-change map.

Remedial Actions. If a change in habitat conditions in the Alviso Slough salt marsh is noted, the Corps and SCVWD will coordinate with USFWS to determine the cause of the habitat changes and whether additional steps are required to minimize impacts on the California clapper rail. The Corps, in coordination with USFWS, will reinitiate consultation if changes in salt marsh habitat continue, if the changes affect listed species, and if the changes are determined to be a result of the Guadalupe River Project with Bypass System Alternative.

Proposed Continuous Water Level and Salinity Monitoring. Streamflow in Alviso Slough directly affects the depth and duration of flooding of the marsh surface and the salinity of the surface water. These changes can affect the distribution of plant species along the marshes of Alviso Slough.

Measurable Objectives. The average monthly depth and duration of flooding of the marsh surface will not exceed that predicted by the HEC-RAS model of Alviso Slough using existing Guadalupe River streamflow data. Average surface-water salinity in Alviso Slough will not be more than 20 percent lower than the 1999-2000 baseline data.

Monitoring Methods. Continuous surface-water level and salinity data will be collected in Alviso Slough at two locations: the Gold Street Bridge and midway between the Gold Street Bridge and the confluence of Alviso Slough and Coyote Creek. Continuous surface-water level and salinity data will also be collected in Guadalupe Slough adjacent to evaporation pond A8D. Flow rates will be measured continuously at the Gold Street Bridge and Guadalupe Slough locations. The continuous recorders will include a vented pressure sensor and will collect data once every 10 minutes.

The locations of each continuous recorder will be surveyed and referenced to a stable benchmark and to each other. The continuous recorders will be located using an existing horizontal datum and will be programmed to record water-surface elevation in feet relative to the National Geodetic Vertical Datum of 1929. Data will be downloaded from the continuous recorders once every 60 days. The elevations of the continuous recorders will be checked at the close of each year's data period relative to the benchmark and to each other.

The depth and duration of flooding over the marsh surface will be determined from the continuous water-level and flow data. Continuous salinity data will be summarized and compared to the Guadalupe River flow rates at the Gold Street Bridge.

Remedial Actions. If the median monthly depth and duration of flooding of the salt marshes plus or minus one standard deviation exceed those predicted by the HEC-RAS model of Alviso Slough, the Corps and SCVWD will coordinate with USFWS to determine the cause of the change in depth and duration of flooding and whether additional steps are required to minimize impacts on the California clapper rail. The Corps, in coordination with USFWS, will reinitiate consultation if changes in hydraulic conditions continue, if the changes affect listed species, and if the changes are determined to be a result of the Guadalupe River Project with Bypass System Alternative.

6.2.6.5 Salt Marsh Harvest Mouse

The salt marsh harvest mouse is both federally listed and State listed as endangered. This species has declined because of loss and fragmentation of habitat as a result of development, changes in vegetation caused by upstream freshwater discharges, and subsidence-related causes. The salt marsh harvest mouse is about 4.6 to 6.9 inches long and weighs between 8 and 12 grams. The salt marsh harvest mouse is known to occur in the San Francisco Bay area.

Habitat Requirements. The salt marsh harvest mouse inhabits pickleweed marshes of the San Francisco Bay. This species is most abundant in deep, dense pickleweed in salt marshes; pickleweed that is not submerged at high tide provides refuge for this species during high winter tides (Shellhammer et al., 1982). Although the salt marsh harvest mouse makes some use of grasses and salt-tolerant forbs at the upper margins of salt and brackish marshes, it is closely tied to the cover of dense pickleweed, and it makes little use of pure bulrush or cordgrass stands (Wondolleck et al., 1976, Shellhammer, 1977). Salt marsh harvest mice inhabit both marshes that are open to tidal action and diked marshes, provided that suitable habitat is present. Section 6.2.5.4, "Salt Marsh and Wetlands – Alviso Slough," provides a description of tidal-marsh habitats along the length of Alviso Slough.

Occurrence in the Guadalupe River Watershed. Several trapping studies have documented the presence of salt marsh harvest mice in pickleweed-dominated marshes in the Alviso area, such as New Chicago Marsh, Triangle Marsh, and Newby Island (Rice, 1974, Zetterquist, 1976, Muench, 1985, Shellhammer et al., 1982, Shellhammer et al., 1985, H. T. Harvey & Associates, 1990c). In some of these locations, salt marsh harvest mice have been captured sporadically or in low numbers.

Nevertheless, this species has been captured fairly consistently in areas providing high-quality pickleweed habitat, and all such habitat in the Alviso area provides at least potentially suitable salt marsh harvest mouse habitat. Trapping surveys found small numbers of salt marsh harvest mice in narrow strips of pickleweed adjacent to bulrush-dominated brackish marsh, although they make little use of adjacent bulrush-dominated areas (H. T. Harvey & Associates, 1990c).

No trapping surveys for salt marsh harvest mice have been conducted along Alviso Slough proper. However, suitable habitat is present in pickleweed-dominated salt marsh along the lower reaches of the slough, extending approximately 3,300 feet upstream from the confluence of Alviso Slough and Coyote Creek (Figure 6.2-6). The presence of this habitat indicates that salt marsh harvest mice are likely to occur in these areas. Along the middle reaches of Alviso Slough, brackish marsh habitat extends approximately 14,000 feet upstream from the salt marsh habitat (Figure 6.2-6). In this area, pickleweed is more sparsely distributed; where present, it is commonly restricted to a narrow, interrupted band at the toe of the levee slope. Because salt marsh harvest mice are known to be present in areas of similar habitat on Newby Island (H. T. Harvey & Associates, 1990c), they are assumed to be present in narrow strips of pickleweed adjacent to bulrush-dominated brackish marsh along Alviso Slough, although they are probably absent from the adjacent bulrush stands (Figure 6.2-11). In some areas along the lower and middle reaches of Alviso Slough, dense, tall vegetation is present on slopes, providing refuge during high tides for salt marsh harvest mice present in the adjacent marshes. The extreme upper reaches of Alviso Slough from the Gold Street Bridge downstream for approximately 3,800 feet are characterized by freshwater marsh habitat (Figure 6.2-6). Owing to the paucity and sparse distribution of pickleweed along the extreme upper reaches of Alviso Slough (H. T. Harvey & Associates, 1990c), salt marsh harvest mice are probably absent from these areas.

Cumulative Impacts. As discussed in Section 6.2.5.4, "Salt Marsh and Wetlands – Alviso Slough," the combined Guadalupe River Project with Bypass System Alternative and Upper Guadalupe River Project will not result in impacts on marsh habitat in Alviso Slough. Therefore, no significant cumulative impacts on the salt marsh harvest mouse would occur as a result of the Guadalupe River Project with Bypass System Alternative and the Upper Guadalupe River Project.

Depending on the flood protection elements constructed for the Lower Guadalupe River Project, the depth, frequency, and duration of inundation of marsh habitat in Alviso Slough as a result of floodflows may or may not change. Some adverse cumulative impacts on the salt marsh harvest mouse may result if there are increases in the depth, frequency, and duration of inundation of marsh habitat in Alviso Slough used by this species. The potential impacts of the Lower Guadalupe River Project on the salt marsh harvest mouse cannot be identified until the final design of the Lower Guadalupe River Project has been determined. If, for example, the Lower Guadalupe River Project includes a change in the 14,000 cfs capacity limitation at the Highway 237 bridge and levees are not raised or a flood bypass is not provided, then the depth and duration of inundation of slough benches from floodflows could increase beyond existing conditions. These changes could result in an adverse impact on the marsh habitat in Alviso Slough used by the salt marsh harvest mouse for nesting and foraging. However, it would be speculative to define potential impacts before the final design of the Lower Guadalupe River Project has been determined. Potential impacts will be considered in the design and analyzed in the environmental review of the Lower Guadalupe River Project.

If a cumulative impact on salt marsh harvest mouse or its habitat as a result of changes in hydrologic or hydraulic conditions due to the flood protection projects, is identified in the BA for the Lower Guadalupe River Project, USFWS has requested that an analysis determine for the decision makers what portion of this cumulative impact, if any, is caused by the Guadalupe River Project with Bypass System Alternative. If some portion of an unexpected cumulative impact is shown to be a result of the Guadalupe River Project with Bypass System Alternative, the Corps, Sacramento District, will reinitiate consultation with USFWS on the Guadalupe River Project. In such a case, Corps policy and regulations exist that can allow for additional mitigation to compensate for impacts proven to be a result of a completed project.

If a cumulative hydrologic or hydraulic impact were to be identified in the BA for the Lower Guadalupe River Project, events and actions would probably occur in the following sequence:

1. Following a BO rendered for the Lower Guadalupe River Project in which a cumulative impact is linked to the completed Guadalupe River Project with Bypass System Alternative, the Corps and SCVWD would review the findings of USFWS.
2. If the Corps and SCVWD concur with the findings of the BO, they would review mitigation needs and determine whether the costs of mitigation appear to be a normal part of the operation and maintenance requirements of the Guadalupe River Project with Bypass System Alternative or if such costs appear to be extraordinary and warrant Federal cost participation. If the costs are an operation and maintenance responsibility, SCVWD would be responsible for them. If the costs appear to warrant Federal participation, the Corps and SCVWD would prepare a postauthorization change report to document the need and costs for mitigating that portion of the cumulative impact determined to be a result of the Guadalupe River Project with Bypass System Alternative.
3. The authorization post change report would be submitted to the Chief of Engineers (if the changes to the project are modest) or to Congress (if the changes are substantial) for authorization of its recommendations.
4. After authorization, the Corps and SCVWD would jointly carry out the authorized mitigation.

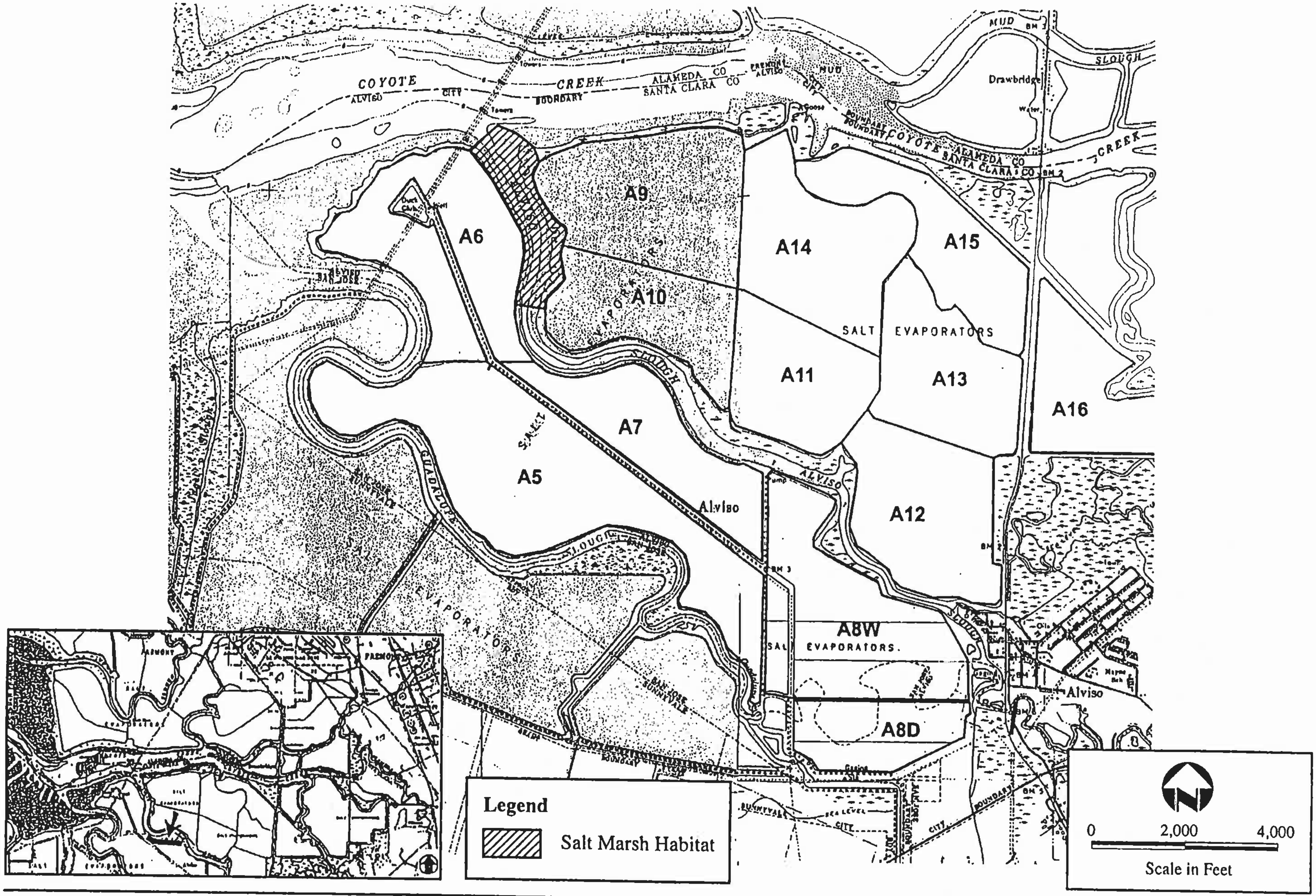

Figure 6.2-11. Prime Salt Marsh Harvest Mouse Habitat in Alviso Slough - Lower Guadalupe/Alviso Slough Area

5. Additional NEPA/CEQA documentation would be prepared as required.

Conservation Measures. No change in flood frequency or adverse impacts on salt marsh harvest mouse habitat are expected to result from construction of the Guadalupe River Project with Bypass System Alternative or the cumulative effects of the Guadalupe River Project with Bypass System Alternative and the Upper Guadalupe River Project.

However as a stipulation for issuing the BO on the Guadalupe River Project with Bypass System Alternative, USFWS has requested that the Corps and SCVWD monitor salt marsh harvest mouse habitat in the Alviso Slough area. The purpose of the monitoring program is to add to baseline data and to determine whether the habitat in the salt marsh changes as a result of construction of the Guadalupe River Project with Bypass System Alternative prior to coordination with USFWS in accordance with the Endangered Species Act and the Fish and Wildlife Coordination Act on the Lower Guadalupe River Project. Available information indicates that the dominant plant associations in the tidal marsh habitat along Alviso Slough vary with the type of water year (dry or wet). Habitat in and adjacent to Alviso Slough has been monitored for more than 10 years (H. T. Harvey & Associates, 1999b). The data from this monitoring will provide a baseline for identifying habitat changes.

The Corps and SCVWD will ensure that a short-term habitat-monitoring program will begin in 2000 and continue through the remaining construction phases of the Guadalupe River Project with Proposed Project. Proposed short-term monitoring methods are outlined in Section 6.2.6.4, "California Clapper Rail," and described in the MMP (Appendix 3). Final short-term monitoring methods for the Alviso Slough area will be developed in coordination with USFWS, and monitoring reports will be submitted to USFWS. Short-term monitoring will end after the Lower Guadalupe River Project has been completed and the Guadalupe River Project with Bypass System Alternative is operational. Completion of the Lower Guadalupe River Project is scheduled for 2002. After short-term monitoring has been completed, monitoring of salt marsh harvest mouse habitat in the Alviso Slough area may continue as a component of the Lower Guadalupe Project MMP, depending on the results of consultation with USFWS on the Lower Guadalupe River Project.

The proposed short-term monitoring program for the salt marsh harvest mouse will focus on two key habitat indicators for the salt marsh harvest mouse:

- Dominant plant species and habitat types in Alviso Slough
- Floodflows, surface-water levels, and salinity in Alviso Slough

For details of the monitoring program, see Section 6.2.6.4, " California Clapper Rail – Conservation Measures."

6.2.7 Cumulative Impacts on Fish

The cumulative impacts on fish and fish habitat discussed in this section focus on the effects of the Guadalupe River Project with Bypass System Alternative and other major projects in the watershed listed in Section 6.2.1, "Projects Addressed in the Cumulative Impact Analysis." The cumulative impacts on fish described below are based on the description of cumulative changes in hydrologic and hydraulic conditions in Section 6.2.2, "Cumulative

Impacts on Hydrologic and Hydraulic Conditions," river morphology in Section 6.2.3, "Cumulative Impacts on River Geomorphology," water quality in Section 6.2.4, "Cumulative Impacts on Water Quality," and SRA cover vegetation in Section 6.2.5, "Cumulative Impacts on Biological Resources – Vegetation."

6.2.7.1 Hydraulic and Hydrologic Impacts

The following analysis of cumulative impacts on fish and fish habitat as a result of cumulative changes to hydraulic and hydrologic conditions focuses on those projects that were identified in Section 6.2.2, "Cumulative Impacts on Hydrologic and Hydraulic Conditions," as principal contributors to the potential cumulative changes in hydraulic and hydrologic conditions in the Guadalupe River watershed: the Upper Guadalupe River Project, Guadalupe River Project with Bypass System Alternative, and Lower Guadalupe River Project.

Flows in the Guadalupe River are usually less than 100 cfs during the December through April wet season and less than 10 cfs from May through November (Appendix 1A). Fish habitat that supports migration, spawning, and rearing is most sensitive to changes in flow when flows are low because water depth and velocity reach critical levels for fish at low flows; that is, the water becomes too shallow to provide fish passage and cover and velocity becomes insufficient to cleanse and oxygenate the gravel that supports fish spawning and production of organisms important as food for fish. The Guadalupe River Project with Bypass System Alternative and the Upper Guadalupe River Project would not affect the frequency or duration of low- to medium-range flows in the natural channel because flows would not be diverted into flood bypasses until they reach approximately 1,500 cfs (Section 6.2.2.3, "Hydrologic and Hydraulic Conditions"). Effects on the timing, magnitude, frequency, and duration of low- to medium-range flows would be avoided, and the depth and velocity conditions needed to support fish migration, spawning, and rearing would not be substantially affected.

As described in Section 5.6.4.1, "Adult and Juvenile Anadromous Fish Migration," the changes in velocities in Segments 1, 2, and 3 of the Guadalupe River Project with Bypass System Alternative would not affect migration of anadromous fish. In addition, velocities in the Bypass System Alternative and the Woz Way to Park Avenue bypasses would not result in adverse effects on migrating anadromous fish. The bypasses in the Upper Guadalupe River Project would operate in a fashion similar to that of the Bypass System Alternative bypass and would not result in adverse effects on migrating anadromous fish (Santa Clara Valley Water District and U.S. Army Corps of Engineers, 2000a).

The bypasses that are part of the Guadalupe River Project with Bypass System Alternative and the Upper Guadalupe River Project would actually result in a reduction in the maximum flow velocities in the natural channel in the bypass reaches during high flow conditions. The natural channel in the bypass reaches is expected to provide refuge for fish during high flow conditions. The combined Guadalupe River Project with Bypass System Alternative and Upper Guadalupe River Project will therefore not result in cumulative adverse impacts on fish and fish habitat from changes in hydraulic and hydrologic conditions in the Guadalupe River watershed.

The potential impact of the Lower Guadalupe River Project on fish and fish habitat as a result of changes in hydraulic and hydrologic conditions cannot be identified until the final design of the Lower Guadalupe River Project has been determined. However, it is possible that some cumulative impacts may result. Any potential impacts that the Lower Guadalupe River Project may have on fish and fish habitat will be considered in the design and analyzed in the environmental review of the Lower Guadalupe River Project.

6.2.7.2 Channel Erosion and Deposition Impacts

The following analysis of cumulative impacts on fish and fish habitat as a result of cumulative changes in channel erosion and deposition focuses on those projects that were identified in Section 6.2.3, "Cumulative Impacts on River Geomorphology," as principal contributors to the potential cumulative changes in channel erosion and deposition in the Guadalupe River watershed: the Guadalupe Creek Restoration Project, Upper Guadalupe River Project, Guadalupe River Project with Bypass System Alternative, and Lower Guadalupe River Project.

The Guadalupe River Project with Bypass System Alternative and the Upper Guadalupe River Project would increase the total volume of water conveyed downstream during high flow conditions (Section 6.2.2, "Hydraulic and Hydrologic Conditions") and could affect erosion and deposition of sediment in localized areas of the river channel as a result of increased velocities (Section 6.2.3, "Cumulative Impacts on River Geomorphology"). The Guadalupe River Project with Bypass System Alternative, Upper Guadalupe River Project, and Guadalupe Creek Restoration Project include channel feature designs that will protect the overall channel from erosion. Such features include invert stabilization structures, rock weirs, and biotechnical bank stabilizers (Section 6.2.1, "Projects Addressed in the Cumulative Impact Analysis"). Channel maintenance flows and gravel-flushing flows will remain in the natural channel to maintain channel form and gravel quality. Therefore, the depth of riffles, flow velocity in riffle areas, spawning gravel occurrence, and the distribution and structure of pools, riffles, runs, and backwaters in the Guadalupe River watershed are not expected to be substantially affected by erosion and deposition (Section 6.2.3, "Cumulative Impacts on River Geomorphology"). The combined Guadalupe River Project with Bypass System Alternative, Upper Guadalupe River Project, and Guadalupe Creek Restoration Project will not result in significant cumulative adverse impacts from changes in erosion and deposition in the Guadalupe River watershed (Section 6.2.3, "Cumulative Impacts on River Geomorphology"). The cumulative impacts of changes in erosion and deposition on fish and fish habitat in the Guadalupe River watershed are therefore expected to be less than significant.

The potential impact of the Lower Guadalupe River Project on fish and fish habitat as a result of changes in channel erosion and deposition cannot be identified until the final design of the Lower Guadalupe River Project has been determined. However, it is possible that some cumulative impacts may result. Any potential impacts that the Lower Guadalupe River Project may have on fish and fish habitat will be considered in the design and analyzed in the environmental review of the Lower Guadalupe River Project.

6.2.7.3 River Morphology Impacts

The following analysis of cumulative impacts on fish and fish habitat as a result of cumulative changes to river morphology focuses on those projects that were identified in Section 6.2.3, "Cumulative Impacts on River Geomorphology," as principal contributors to the potential cumulative changes in river morphology: Guadalupe Creek Restoration Project, Upper Guadalupe River Project, Guadalupe River Project with Bypass System Alternative, Lower Guadalupe River Project, and Santa Clara Valley Water District Fish Ladder Construction Program.

The Guadalupe River Project with Bypass System Alternative, Upper Guadalupe River Project, and Guadalupe Creek Restoration Project include grading, channel widening, and channel armoring activities (Section 6.2.1, "Projects Addressed in the Cumulative Impact Analyses"). These activities would affect fish habitat, including the occurrence of gravel and the distribution and structure of pools, riffles, runs, and backwaters (Section 6.2.3, "Cumulative Impacts on the River Geomorphology"). However, low-flow channel structures in areas of river-bottom armoring, invert stabilization structures in the natural channel, spawning gravel replacement, SRA cover vegetation replacement, and other environmental commitments would reestablish fish habitat values (Section 3.4.2, "Construction Features," Section 3.4.3, "Environmental Commitments," and Section 6.2.1, "Projects Addressed in the Cumulative Impact Analyses"). The combined Guadalupe River Project with Bypass System Alternative, Upper Guadalupe River Project, and Guadalupe Creek Restoration Project will not result in significant cumulative adverse impacts from changes in river morphology in the Guadalupe River watershed (Section 6.2.3, "Cumulative Impacts on River Geomorphology"). The cumulative adverse impacts on anadromous fish migration, spawning gravel, and rearing habitat in the Guadalupe River watershed would be avoided, minimized, and mitigated. The potential impact of the Lower Guadalupe River Project on fish and fish habitat resulting from changes in river morphology cannot be identified until the final design of the Lower Guadalupe River Project has been determined. However, it is possible that some cumulative impacts may result. Any potential impacts that the Lower Guadalupe River Project may have on fish and fish habitat will be considered in the design and analyzed in the environmental review of the Lower Guadalupe River Project.

The Guadalupe River Project with Bypass System Alternative, Upper Guadalupe River Project, and Santa Clara Valley Water District Fish Ladder Construction Program include actions that would remove or modify physical barriers to fish passage (Section 6.2.1, "Projects Addressed in the Cumulative Impact Analyses"). Passage improvements associated with the Guadalupe River Project with Bypass System Alternative include removal of the USGS gage located near the St. John Street Bridge and relocation of an exposed gas and sewer line that crosses the river near Old Julian Street Bridge (Section 3.4.3.2, "Environmental Commitments – Measures to Compensate for Adverse Project Effects"). The Upper Guadalupe River Project and the Santa Clara Valley Water District Fish Ladder Construction Program will provide for fish passage in the locations of several structures on the Guadalupe River, Guadalupe Creek, and Alamitos Creek (Section 6.2.1, "Projects Addressed in the Cumulative Impact Analyses").

Because of the improvements to fish passage conditions and the environmental commitments included as part of the projects in the Guadalupe River watershed, cumulative impacts on fish migration, spawning, and rearing would be less than significant. The cumulative effects are potentially beneficial to anadromous species because passage improvements will provide for access to a minimum of an additional 10.9 miles of spawning and rearing habitat on Alamitos Creek and Guadalupe Creek.

6.2.7.4 Suspended Solids and Toxic Constituents Impacts

The introduction of suspended solids and toxic constituents to the Guadalupe River during and after construction of the Guadalupe River Project with Bypass System Alternative and other major projects listed in Section 6.2.1, "Projects Addressed in the Cumulative Impact Analyses," would be avoided and minimized (Section 6.2.4, "Cumulative Impacts on Water Quality"). Adverse effects on fish species would therefore not occur.

Implementation of the Guadalupe River watershed flood protection projects and the Guadalupe Creek Restoration Project is expected to result in the following:

- No change in the amount or rate of sediments entering the Guadalupe River from sources such as surface runoff and storm drains
- A reduction in net erosion caused by peak flow conveyance in the Guadalupe River system
- No change and a potential reduction in the overall rate of erosion and sediment deposition on a watershed scale

Cumulative adverse effects on fish species due to erosion or sediment deposition would be less than significant.

The flood protection projects also would not affect the source or input of mercury into the system. Therefore, the existing mercury budget for the Guadalupe watershed would not increase as a result of implementation of the projects (Section 6.2.4.3, "Toxic Constituents – Mercury"). In addition, there is no evidence to suggest that operation of the flood protection projects and the Guadalupe Creek Restoration Project would increase aquatic organism exposure to bioavailable mercury. To the contrary, the projects would discourage the development of instream conditions such as wetlands or other anoxic, high sulfate, low pH, high organic matter aquatic environments that would be conducive to enhanced methylation. By creating a better-defined low-flow channel, the Guadalupe River Project with Bypass System Alternative, the Upper Guadalupe River Project, and the Guadalupe Creek Restoration Project would create more concentrated, less stagnant flows, thereby resulting in reduced anoxic conditions. Cumulative adverse effects on fish species and aquatic organisms would be less than significant.

6.2.7.5 Water Temperature and Dissolved Oxygen Impacts

The following analysis of cumulative impacts on fish and fish habitat as a result of cumulative changes to water temperatures and dissolved oxygen concentrations focuses on those projects that were identified in Section 6.2.4, "Cumulative Impacts on Water Quality," as principal contributors to the potential cumulative changes in water temperatures and dissolved oxygen concentrations in the Guadalupe River watershed: the Guadalupe Creek Restoration Project, Upper Guadalupe River Project, Guadalupe River Project with Bypass System Alternative, and Lower Guadalupe River Project.

Water temperatures in the Guadalupe River are often less than optimal and sometimes lethal to chinook salmon and steelhead, especially during the summer and early fall months (Section 4.6.3.5, "Water Temperature"; Appendix 1A). Removal of SRA cover vegetation during construction of the Guadalupe River Project with Bypass System Alternative and the

Upper Guadalupe River Project would temporarily increase water temperature in the Guadalupe River downstream from Almaden Lake (Figure 6.2-4; Section 6.2.4, "Cumulative Impacts on Water Quality"). The increase in water temperature could adversely affect chinook salmon and steelhead, as described for the Guadalupe River Project (Section 5.6.4, "Bypass System Alternative") and the Upper Guadalupe River Project (Santa Clara Valley Water District and U.S. Army Corps of Engineers, 2000a).

In addition to the direct effects of individual projects on water temperature and the associated effects on chinook salmon and steelhead, the Upper Guadalupe River Project would cause an incremental increase in water temperatures between Grant Street and West Taylor Street (model segments 30 through 35 in Figure 6.2-4; Section 6.2.4.4, "Cumulative Impacts on Water Quality – Temperature"). The cumulative impact of the Upper Guadalupe River Project and the Guadalupe River Project with Bypass System Alternative on chinook salmon and steelhead would be less than significant because:

- The incremental change in water temperature would be relatively small, especially from October through May, when most anadromous fish life stages are present (Figures 6.2-4 and 6.2-5; Section 6.2.4.4, "Cumulative Impacts on Water Quality – Temperature"), and water temperatures during the summer months would be within the range that would support rearing of juvenile steelhead.
- The actual increase in water temperature should be less than simulated because shade provided by SRA cover vegetation reestablished in Segment 3 of the Guadalupe River Project with Bypass System Alternative would begin to cool water temperatures prior to construction of interacting elements of the Upper Guadalupe River Project.
- The stream length affected by the incremental change is relatively small and juvenile steelhead could move to locations that provide more suitable temperatures, including upstream reaches, deeper pools, and areas of local cool water inflows.

Water temperature increases caused by the Upper Guadalupe River Project and the Guadalupe River Project with Bypass System Alternative would not interact with water temperature increases potentially caused by the Lower Guadalupe River Project and would not result in an adverse cumulative impact on anadromous fish. The Guadalupe River Project would not affect water temperatures downstream from Highway 101 at the downstream end of model segment 39 (Figure 6.2-4; Section 6.2.4, "Cumulative Impacts on Water Quality"). Also, the actual increase in water temperature between I-880 and Highway 101 (model segments 38 and 39 in Figure 6.2-4) should be less than simulated because shade provided by SRA cover vegetation has been partially reestablished in Segments 1 and 2 of the Guadalupe River Project (Section 5.4.2, "No-Action Alternative"). Postmitigation water temperature impacts of the Guadalupe River Project with Bypass System Alternative and Upper Guadalupe River Project would be less than significant. At maturation, planted SRA cover vegetation in the Upper Guadalupe River Project area is expected to cool water temperatures and, compared to preproject conditions, improve habitat conditions for chinook salmon and steelhead (Figures 6.2-4 and 6.2-5). The cooling of water temperatures would extend into the project area of the Guadalupe River Project with Bypass System Alternative. SRA cover vegetation planted in Segments 1 and 2 of the Guadalupe River Project and in Reach A would cool water temperatures in Reach A to lower than preproject conditions. SRA cover vegetation planted as part of the Guadalupe Creek Restoration

Project would also cool water temperatures and improve habitat conditions for steelhead and chinook salmon compared to preproject conditions, although the effects would be limited to Guadalupe Creek. Under postmitigation conditions, the long-term cumulative effect of the Guadalupe River Project with Bypass System Alternative and the other major projects in the Guadalupe River watershed on water temperatures would be to benefit anadromous species in Guadalupe Creek (model segments 5 and 6) and in the Guadalupe River (model segments 19 through 31, 38, and 39) (Figure 6.2-4).

As discussed in Section 6.2.4.5, "Cumulative Impact on Water Quality – Dissolved Oxygen," the cumulative impact of increased water temperatures on dissolved oxygen concentrations is less than significant because concentrations of dissolved oxygen will remain within the natural range of daily variations in dissolved oxygen. Cumulative impacts of variations in dissolved oxygen concentrations on fish and fish habitat would be less than significant.

The potential impact of the Lower Guadalupe River Project on fish and fish habitat resulting from changes in water temperatures cannot be identified until the final design of the Lower Guadalupe River Project has been determined. However, it is possible that some cumulative impacts may result. Any potential impacts that the Lower Guadalupe River Project may have on fish and fish habitat will be considered in the design and analyzed in the environmental review of the Lower Guadalupe River Project.

6.2.7.6 Shaded Riverine Aquatic Cover Impacts

The following analysis of cumulative impacts on fish and fish habitat as a result of cumulative changes to SRA cover focuses on those projects that were identified in Section 6.2.5, "Cumulative Impacts on Biological Resources – Vegetation," as principal contributors to the potential cumulative changes in SRA cover: the Santa Clara Valley Water District Fish Ladder Construction Program, Guadalupe Creek Restoration Project, Upper Guadalupe River Project, Guadalupe River Project with Bypass System Alternative, and Lower Guadalupe River Project.

The channel widening, bank excavation, and channel bed and bank armoring associated with the Guadalupe River Project with Bypass System Alternative and other major projects would remove SRA cover vegetation (Section 6.2.5.2, "Cumulative Impacts on Biological Resources – Vegetation – SRA Cover Vegetation"). The removal of SRA cover, including instream and overhead components, could adversely affect rearing habitat by exposing fish to predators, reducing the availability of resting areas, and reducing the abundance of aquatic food organisms.

The Santa Clara Valley Water District Fish Ladder Construction Program, Guadalupe Creek Restoration Project, Upper Guadalupe River Project, Guadalupe River Project with Bypass System Alternative, and Lower Guadalupe River Project would all include reestablishment and additional planting of SRA cover vegetation in both onsite and offsite locations (Section 6.2.1, "Projects Addressed in the Cumulative Impacts Analyses," and Section 6.2.5.2, "Cumulative Impacts on Biological Resources – Vegetation – SRA Cover Vegetation"). SRA cover vegetation would be planted along Guadalupe Creek below Masson Dam and at multiple locations along the Guadalupe River from downstream from Almaden Lake to Airport Parkway in Reach A. In addition, installation of rock weirs and biotechnical features as part of Guadalupe Creek Restoration Project, Upper Guadalupe River Project, and

Guadalupe River Project with Bypass System Alternative wouldprovide instream cover. The planting of SRA cover vegetation and the installation of instream cover features will reestablish cover and rearing areas and reduce cumulative adverse impacts on resident and anadromous fish rearing to less-than-significant levels.

The potential impact of the Lower Guadalupe River Project on fish and fish habitat resulting from changes in SRA cover cannot be identified until the final design of the Lower Guadalupe River Project has been determined. However, it is possible that some cumulative impacts may result. Any potential impacts that the Lower Guadalupe River Project may have on fish and fish habitat will be considered in the design and analyzed in the environmental review of the Lower Guadalupe River Project.

6.2.8 Land Use and Planning

As described in Section 5.7, "Land Use and Planning," the Guadalupe River Project with Bypass System Alternative would be consistent with existing land use plans, policies, and regulations. The Guadalupe River Project with Bypass System Alternative would not change existing land uses and is compatible with surrounding land uses. The Guadalupe River Project with Bypass System Alternative therefore would not contribute to other ongoing regional impacts associated with development or other land use conversions.

6.2.9 Recreation, Public Access, and Visual Resources

The Guadalupe River Project with Bypass System Alternative in combination with the other major projects indicated in Section 6.2.1, "Projects Addressed in the Cumulative Impact Analysis," could result in a short-term cumulative impact on recreational opportunities along the Guadalupe River and access to the river corridor. This cumulative impact is considered less than significant because construction of the projects would not occur simultaneously and the projects would not directly affect parks or other formal river access points. The Guadalupe River Project with Bypass System Alternative would not contribute to a cumulative impact on boating because the project features would accommodate existing opportunities for boating.

Construction of the Bypass System Alternative in combination with other projects along the river corridor would affect the visual character of the river corridor by removing riparian vegetation. Only localized viewsheds would be affected. Successful implementation of SRA cover and riparian vegetation mitigation would restore and in some cases enhance the aesthetic character of the river corridor. The Upper Guadalupe River Project and the Guadalupe Creek Restoration Project would result in a substantial increase in SRA cover vegetation compared to existing conditions. Replanting riparian vegetation in areas along the river disturbed during construction of each project, in combination with proposed infill plantings would result in a less-than-significant cumulative impact on visual resources.

The Guadalupe River Project with Bypass System Alternative, the Guadalupe River Park Project, and the Upper Guadalupe River Project would result in additional recreation opportunities along the Guadalupe River. The potential impact of the Lower Guadalupe River Project on recreation cannot be identified until the final design of the Lower Guadalupe River Project has been determined. It is possible, however, that some cumulative impacts may result. Any potential impacts that the Lower Guadalupe River Project may have on recreation will be considered in the design and analyzed in the environmental review of the Lower Guadalupe River Project.

6.2.10 Transportation and Traffic

The direct effects of the Guadalupe River Project with Bypass System Alternative on transportation and traffic are described in Section 5.9, "Transportation and Traffic." Cumulative impacts on traffic in the project area are related to the combination of the Guadalupe River Project with Bypass System Alternative, completion of State Route 87 between New Julian Street and Highway 101, and construction of the Vasona LRT Project. Construction of the bypass system as part of the Bypass System Alternative is scheduled to begin in 2002 and end in 2004. The overlap between the construction periods for the Bypass System Alternative, the State Route 87 project, and the Vasona LRT Project will cause short-term cumulative impacts on traffic. However, these impacts would not be substantial because project-specific mitigation measures for traffic have been developed and will be implemented for all three projects. Consequently, the short-term cumulative impacts on transportation and traffic during construction are considered less than significant.

The Guadalupe River Project with Bypass System Alternative would not contribute to a long-term cumulative impact on transportation and traffic because roadway capacities through the project site would not change and only occasional trips would be required for maintenance and operation.

6.2.11 Air Quality

Because the major projects occurring along the Guadalupe River would have little operational impacts on air quality, the only major potential cumulative air quality impact is associated with short-term construction impacts. Standard construction-period mitigation measures required by BAAQMD for all projects in the Guadalupe River watershed would prevent significant cumulative emissions of dust and equipment exhaust and would ensure that emissions would not conflict with BAAQMD's 1997 Clean Air Plan and its 1999 Ozone Attainment Plan. No significant cumulative impacts on air quality would result from the combined impacts of the major projects occurring along the Guadalupe River.

6.2.12 Noise

As indicated in Section 5.11, "Noise," the Guadalupe River Project with Bypass System Alternative is not expected to generate additional noise once the flood protection features have been constructed. This project therefore would not contribute to a long-term cumulative impact on noise. Although project-related construction noise would occur, it would not contribute to a cumulative impact on noise when combined with other major projects because no noise-sensitive receptors are located in the area of the Guadalupe River Project with Bypass System Alternative and because all construction would occur during daylight hours.

6.2.13 Hazards and Hazardous Materials

The Guadalupe River Project with Bypass System Alternative would not directly contribute to cumulative long-term impacts involving hazardous materials because the project does not include the long-term use, storage, or disposal of hazardous materials. The hazardous waste mitigation measures identified in Section 5.10, "Hazards and Hazardous Materials," would ensure that construction activities associated with the Guadalupe River Project with Bypass System Alternative would not contribute to impacts from hazardous materials on people or the environment. Mercury contamination of sediments in the Guadalupe River, Guadalupe Creek, and other area streams is a preexisting regional issue that is under the jurisdiction of CAL-EPA, SWRCB, and the San Francisco Bay RWQCB. The issue of cumulative impacts related to mercury is discussed in Section 6.2.4, "Cumulative Impacts on Water Quality."

6.2.14 Cultural Resources

As indicated in Section 5.14, "Cultural Resources," construction of the Guadalupe River Project with Bypass System Alternative is not expected to affect known historic or prehistoric cultural resources. In the event unknown historic or prehistoric cultural resources are disturbed during construction, impacts would be avoided by evaluating and treating the site. Treatment could consist of data recovery or avoidance.

The Guadalupe River Project with Bypass System Alternative would not contribute to the cumulative loss of known historic or prehistoric cultural resources because none would be affected during construction. In addition, the Bypass System Alternative would result in less-than-significant cumulative impacts on unknown cultural resources because sites would be evaluated and protected or information about the site properly recorded if cultural resources are unearthed during construction.

6.3 Cumulative Impacts – Refined Bypass System Alternative (Proposed Action) and Other Guadalupe River Projects

The Refined Bypass System Alternative would include all the flood protection components that would be constructed as part of the Bypass System Alternative except for the armoring of the east bank of the Guadalupe River in the vicinity of the New Julian Street Bridge (Figure 3.5-1). Channel bank armoring under the Refined Bypass System Alternative would total approximately 5,332 lf or 200 lf less than under the Bypass System Alternative. The Refined Bypass System Alternative would directly affect 5.41 acres of riparian vegetation, which is 0.35 acre less than under the Bypass System Alternative. The Refined Bypass System Alternative would directly affect approximately 3,789 lf of SRA cover vegetation, which is approximately 72 lf less than under the Bypass System Alternative. The east bank recreational trail would not pass under the New Julian Street Bridge as it would under the Bypass System Alternative. Instead, the trail would be rerouted through the intersection of New Julian Street and North River Street to ensure continuous public access to the east side of the Guadalupe River. The Refined Bypass System Alternative would include the same environmental commitments identified for the Bypass System Alternative.

The cumulative impacts of the Guadalupe River Project with Refined Bypass System Alternative and other projects in the Guadalupe River watershed would be similar to the cumulative impacts of the Guadalupe River Project with Bypass System Alternative and other projects in the Guadalupe River watershed described in Section 6.2 ("Cumulative Impacts – Bypass System Alternative and Other Guadalupe River Projects"). Table 6.4-1 summarizes the cumulative impacts and environmental commitments for both the Bypass System Alternative and the Refined Bypass System Alternative.

6.4 Cumulative Impacts – No-Action Alternative and Other Guadalupe River Projects

The No-Action Alternative includes flood protection components in Segments 1 and 2 and Segment 3C Phases 1 and 2 of the Guadalupe River. The flood protection components in Segments 1 and 2 were completed in 1994 and 1996, respectively. The flood protection components in Segment 3C Phase 1 were completed in January 2000 and those in Segment 3C Phase 2 are scheduled for completion in early 2002. The No-Action Alternative includes several mitigation components, as described in Chapter 3, "Alternatives, Including the Proposed Action." These include:

- Planting 21.0 acres of riparian vegetation mitigation in Segments 1 and 2
- Planting a minimum of 4,526 lf of SRA cover vegetation in Segments 1 and 2, the Woz Way to Park Avenue bypass reach, Reach A, and along Guadalupe Creek; additional HEP analyses may indicate that additional SRA cover vegetation mitigation is necessary
- Replacing up to 5,090 sf of river-run gravels
- Installing a low-flow channel in Segment 3C to provide fish passage; armored sections of Segments 1 and 2 already have a low-flow channel installed

The construction of Segment 3C Phase 2 and the mitigation components listed above are the only changes from existing conditions that would occur with the No-Action Alternative. The following analysis of the cumulative impacts of the No-Action Alternative and past, present, and reasonably foreseeable actions in the Guadalupe River watershed is based on the premise that the No-Action Alternative would result in little change from existing conditions.

6.4.1 Hydrology and Hydraulics

Under the No-Action Alternative, flood protection for the 100-year design floodflow would not be provided for the downtown San Jose area. In addition, the capacity of the lower Guadalupe River may not need to be increased if the No-Action Alternative is implemented. The hydrologic conditions in Segments 1, 2, and 3 would be similar to those under the existing conditions. No adverse indirect or cumulative impacts are expected because the No-Action Alternative would not change the overall channel capacity in the downtown project area. The beneficial impacts of flood protection would not be provided.

6.4.2 River Geomorphology

Under the No-Action Alternative, no significant impacts on river morphology are expected during construction of Segment 3C Phase 2 because minor changes to the pattern of pools, riffles, and runs due to channel bed armoring will be compensated for by construction of the trapezoid/boulder low-flow channel. Cumulative impacts of the No-Action Alternative and projects in the Guadalupe River watershed would consist of continued bank and bed instability in Segment 3 because no invert stabilization structures would be constructed in that segment. This would be a less-than-significant impact because it would not change the characteristics of channel erosion occurring under existing conditions.

6.4.3 Water Quality

No significant impacts on water quality are expected during construction of Segment 3C Phase 2 because any impacts would be fully mitigated by implementing erosion-control programs during construction. No significant indirect or cumulative impacts on water quality are expected as a result of the incremental impacts of the No-Action Alternative.

6.4.4 Biological Resources – Vegetation

The potential cumulative impacts on vegetation resources of the No-Action Alternative and projects in the Guadalupe River watershed will be similar to those described in Section 6.2.5, "Cumulative Impacts on Biological Resources – Vegetation." No significant indirect or cumulative impacts on riparian vegetation are expected as a result of the incremental impacts of the No-Action Alternative because of the 21.0 acres of riparian vegetation that have already been planted as mitigation for riparian losses. The No-Action Alternative would affect 4,526 lf of SRA cover vegetation; however, a minimum of 4,526 lf of SRA cover vegetation mitigation will be planted as mitigation. Therefore, no significant indirect or cumulative impacts on SRA cover vegetation are expected as a result of the incremental impacts of the No-Action Alternative. If the No-Action Alternative is selected, an additional HEP analysis will be conducted to determine if additional SRA cover vegetation mitigation is necessary.

6.4.5 Biological Resources – Wildlife

The potential cumulative impacts on wildlife of the No-Action Alternative and projects in the Guadalupe River watershed will be similar to those described in Section 6.2.6, "Cumulative Impacts on Biological Resources – Wildlife." The No-Action Alternative will result in no significant indirect or cumulative impacts on wildlife.

6.4.6 Biological Resources – Fisheries

The cumulative impact on water temperatures of the Upper Guadalupe River Project and the No-Action Alternative would consist of the potential elevation of water temperatures in the downtown project area above the temperatures that would occur if only the No-Action Alternative were selected. This temperature increase would be less than expected for the Bypass System Alternative because less SRA cover vegetation would be removed under the No-Action Alternative. The potential temperature increase would be mitigated by the incremental decrease in temperatures expected once mitigation plantings for the Upper Guadalupe River Project have reached maturity.

Under the No-Action Alternative, the USGS gage at St. John Street and the exposed gas and sewer lines upstream from UPRR Bridge No. 4, which are potential fish passage barriers, will not be removed or relocated. This would be a less-than-significant impact because it would not change the fish passage characteristics occurring under existing conditions.

6.4.7 Other Resources

The cumulative impacts of the No-Action Alternative and projects in the Guadalupe River watershed will be similar to the impacts described for the Guadalupe River Project with

Bypass System Alternative in Section 6.2, "Cumulative Impacts – Bypass System Alternative and Other Guadalupe River Projects," for the following resource areas:

- Land use and planning
- Recreation, public access, and visual resources
- Transportation and traffic
- Air quality
- Noise
- Hazards and hazardous materials
- Cultural resources

Long-term beneficial cumulative impacts of the No-Action Alternative and projects in the Guadalupe River watershed would be less than those described for the Guadalupe River Project with Bypass System Alternative in Section 6.2, "Cumulative Impacts – Bypass System Alternative and Other Guadalupe River Projects." If the No-Action Alternative is selected, bank erosion would not be reduced in the project area, and instream habitat values would not show as much increase.

6.5 Summary of Cumulative Impacts

Table 6.4-1 (provided at the end of this chapter) summarizes the cumulative environmental effects expected to occur under the No-Action Alternative, the Bypass System Alternative, and the Refined Bypass System Alternative (Proposed Action). It includes the impacts analyzed and mitigation described in Section 6.2, "Cumulative Impacts – Bypass System Alternative and Other Guadalupe River Projects;" Section 6.3, "Cumulative Impacts – Refined Bypass System Alternative (Proposed Action) and Other Guadalupe River Projects;" and Section 6.4, "Cumulative Impacts – No-Action Alternative and Other Guadalupe River Projects."

6.6 Other Required Analyses

6.6.1 Relationship between Short-Term Uses of the Environment and the Maintenance and Enhancement of Long-Term Productivity

Short-term uses of the environment that would occur as a result of construction of the Refined Bypass System Alternative and that would narrow the range of beneficial uses of the environment include impacts on existing riparian vegetation and SRA cover vegetation as well as impacts from other construction-related activities. In the long term, planting to recreate these habitat types will offset the loss of riparian vegetation and SRA cover vegetation and enhance the long-term productivity of the Guadalupe River watershed. Other short-term environmental impacts associated with construction activities, such as reduced air quality and increased noise and traffic, would occur only during the construction phase of the Guadalupe River Project with Refined Bypass System Alternative and would not affect the long-term productivity of the environment.

6.6.2 Irreversible or Irretrievable Commitments of Resources

The Guadalupe River Project with Refined Bypass System Alternative would result in the irretrievable commitment of fossil fuels, other energy resources needed to construct channel modifications and the bypass system, and construction materials. The construction of the channel modifications is not considered an irreversible or irretrievable commitment of resources because the Guadalupe River Project with Refined Bypass System Alternative will enhance the ability of an existing stream channel to pass floodflows. The bypass system would be a permanent fixture and would be an irreversible change in land use. The bypass system will be covered and thus will not be incompatible with either urban or open-space uses of the surrounding area. Proposed recreation facilities would also result in an irreversible change in land use along the Guadalupe River. The proposed recreation facilities are in accordance with the Guadalupe River Park Master Plan and are therefore an anticipated change in land use.

6.6.3 Growth-Inducing Impacts

The areas of the City of San Jose adjacent to the Guadalupe River are almost completely developed, and there is little remaining vacant land. Urban growth in the downtown project area is not currently restricted by the potential for flooding. Implementation of the Guadalupe River Project with Refined Bypass System Alternative is not expected to remove a significant restraint to growth.

6.6.4 Identification of the Environmentally Preferred and Environmentally Superior Alternative

The Corps and SCVWD have identified the Refined Bypass System Alternative as the environmentally preferred and the environmentally superior alternative, pursuant to the requirements of NEPA and CEQA, respectively. The environmentally preferred and environmentally superior alternative is the alternative that causes the least damage to the biological and physical environment and protects, preserves, and enhances historic, cultural, and natural resources while accomplishing the project's objectives.

The Refined Bypass System Alternative would result in a slight decrease in bank armoring and a decrease in impacts on riparian vegetation and SRA cover vegetation compared to the Bypass System Alternative. The Refined Bypass System Alternative would also meet flood protection goals while maintaining water temperatures, provide habitat for endangered fish species, and provide recreational opportunities.

Although the No-Action Alternative would result in fewer direct environmental impacts, it would not meet the objectives to provide 100-year flood protection to downtown San Jose, maintain or improve water temperatures, provide and restore habitat for endangered fish species, and provide recreational opportunities.

The selection of the Refined Bypass System Alternative as the environmentally preferred and environmentally superior alternative is based on the conclusions of the impact analyses presented in Chapter 5 and Chapter 6 of this Report.

TABLE 6.4-1. Comparison of Cumulative Environmental Impacts
Cumulative impacts include incremental impacts from each project alternative added to the individual impacts of other major projects in the Guadalupe River watershed. Projects included in the cumulative impact analysis are described in Section 6.2.1 and listed at the end of this table.

	Impact and Environmental Commitment	
Resource and Issues	**Bypass System Alternative and Other Projects[a]/ Refined Bypass System Alternative and Other Projects**	**No-Action and Other Projects**
6.2.2 HYDROLOGIC AND HYDRAULIC IMPACTS		
Flood Protection	Would convey the 100-year design floodflow. (B)	No change from existing conditions. Floodwaters would not be contained in the river channel during the 100-year design floodflow.
Hydrologic and Hydraulic Impacts	Under the 2-year design floodflow, mean channel velocities would decrease. Under high flow conditions (flows equal to or greater than the 10-year design floodflow), velocities would decrease in bypassed segments of the river channel compared to existing conditions but increase in armored sections. Velocities during high flows would be greater than under existing conditions because floodflows would remain in the river. Changes in flow velocity could change the suitability of the affected channel reaches for aquatic species. Cumulative impacts on aquatic species are discussed in Section 6.2.7. Flow velocities in the bypasses would exceed the flow velocity in the river channel when flows are equal to or greater than the 10-year design floodflow. Differences in flow velocity in the bypasses and the natural channel may change the suitability of the affected channel reaches for aquatic species. Cumulative impacts on aquatic species are discussed in Section 6.2.7. The total volume of flow discharged to the South Bay during any flood would not change appreciably with completion of the major projects in the Guadalupe River watershed. The total volume of floodflows might reach the South Bay hours or a day earlier than under existing conditions, which would not be a substantial change. (LS)	The hydrologic conditions in Segments 1, 2, and 3 would be similar to existing conditions. No indirect or cumulative adverse impacts are expected because the No-Action Alternative would not change the existing channel capacity in the downtown project area.

NOTES: NE = NO EFFECT LS = LESS-THAN-SIGNIFICANT ADVERSE EFFECT S = SIGNIFICANTADVERSE EFFECT B = BENEFICIAL EFFECT

TABLE 6.4-1. (Continued)

	Impact and Environmental Commitment	
Resource and Issues	**Bypass System Alternative and Other Projects[a]/ Refined Bypass System Alternative and Other Projects**	**No-Action and Other Projects**
Construction – Channel Erosion and Deposition	Erosion and increased sedimentation in the Guadalupe River during construction would be avoided by implementing the SWPPP and erosion and sediment control plan. (LS)	Erosion and increased sedimentation in the Guadalupe River during construction would be avoided by implementing the SWPPP and erosion and sediment control plan. (LS)
Construction – River Morphology	Cumulative flood protection project features would not alter the sediment load, would be designed to maintain sediment transport continuity, and would be limited in length compared to the river as a whole. (LS) Changes in channel form may change the suitability of the affected channel reaches for aquatic species. Cumulative impacts on aquatic species are discussed in Section 6.2.7.	Cumulative flood protection project features would not alter the sediment load and would be designed to maintain sediment transport continuity. (LS)
Operation – Channel Erosion and Deposition	The transport of wash load (fine sediments) through the river to San Francisco Bay would not be affected because velocities necessary for transport would be maintained. Bedload sediment would continue to settle out between Trimble Road and Montague Expressway in the lower Guadalupe River. In summary, sediment transport would not be affected by the operation of projects in the Guadalupe River watershed. (LS) Channel erosion and deposition may change in localized areas in response to the specific magnitude and duration of a flood. Constructed channel features, such as invert stabilization structures, rock weirs, or biotechnical bank stabilizers, would avoid or minimize areas of channel erosion throughout the natural channel of the Guadalupe River. Modeling would continue to be conducted during the design phase of the Guadalupe River Project with Bypass System Alternative to assist in the selection and design of channel features to protect the channel from erosion. (LS)	The sediment transport capacity and sediment load carried in river flows downstream from Segment 3C would not change, and the existing channel erosion processes would continue. (LS)
Operation – River Morphology	The frequency and duration of channel maintenance flows in the river channel would not be affected because the bypasses would not become operational until flows reach 1,500 cfs. Therefore, there would be little or no change in the pattern of riffles, runs, and pools and in the transport of the river's sediment load over the long term. (LS) Low-flow channels would be constructed in armored sections of the river channel to assist in sediment transport and to provide fish passage. (LS)	Bank and bed stability in Segments 1, 2, and 3 would continue to decrease. However, this would be a less-than-significant impact because it would not change the existing river morphology in the project area of the No-Action Alternative. (LS)

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TABLE 6.4-1. (Continued)

	Impact and Environmental Commitment	
Resource and Issues	**Bypass System Alternative and Other Projects[a]/ Refined Bypass System Alternative and Other Projects**	**No-Action and Other Projects**
6.2.4 Water Quality Impacts		
Construction – Suspended Solids and Biostimulatory Nutrients	The incremental contributions of suspended solids from construction activities in the Guadalupe River watershed are anticipated to be less than significant because soil-disturbing activities would be conducted in compliance with approved SWPPPs, erosion and sediment control plans, and mitigation and monitoring plans. (LS)	No significant impacts are expected during construction of Segment 3C Phase 2 because impacts would be fully mitigated by implementing erosion control programs. No indirect or cumulative impacts on water quality are expected as a result of the incremental impacts of the No-Action Alternative. (LS)
Operation – Suspended Solids and Biostimulatory Nutrients	Operation and maintenance of the flood protection projects on the Guadalupe River would not cause long-term changes in the transport of wash load sediments in the channel. Maintenance activities may cause temporary and intermittent disturbances of channel and bank sediments. Maintenance activities would be infrequent and would incorporate erosion and sediment control measures. Long-term operation and maintenance of flood protection projects on the Guadalupe River would not adversely affect beneficial uses of the river or result in the degradation of water quality. (LS)	Cumulative impacts of the No-Action Alternative and other projects in the Guadalupe River watershed would be similar to the cumulative impacts identified for the Guadalupe River Project with Bypass System Alternative. (LS)
Construction – Toxic Constituents	Any temporary impairment of water quality resulting from spills of construction materials would be avoided through the implementation of SWPPPs and erosion and sediment control plans. Cumulative impacts would be less than significant because toxic materials control and spill-response plans would be implemented for major construction projects occurring in the watershed to avoid or control potential accidents. (LS) The potential for increased mercury deposition into the river would be eliminated or minimized through the routine sampling of excavated material and the proper disposal or reuse of this material. The Corps and SCVWD would implement the project's Soil Management Plan to minimize discharges of mercury-laden sediments during construction activities and ensure the proper disposal and reuse of mercury-laden soil. (LS)	Cumulative impacts of the No-Action Alternative and other projects in the Guadalupe River watershed would be similar to the cumulative impacts identified for the Guadalupe River Project with Bypass System Alternative. (LS)
Operation – Toxic Constituents	To minimize operational affects, SCVWD would participate with the San Francisco Bay RWQCB in assessing mercury transport in the Guadalupe River and the potential for methylation associated with proposed wetland and riparian mitigation. SCVWD's participation would include monitoring of flow, total suspended solids, total and bioavailable mercury, and methyl mercury concentrations in river-bottom and suspended sediments of the Guadalupe River for 1 year. (LS)	Cumulative impacts of the No-Action Alternative and other projects in the Guadalupe River watershed would be similar to the cumulative impacts identified for the Guadalupe River Project with Bypass System Alternative. (LS)

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TABLE 6.4-1. (Continued)

	Impact and Environmental Commitment	
Resource and Issues	**Bypass System Alternative and Other Projects[a]/ Refined Bypass System Alternative and Other Projects**	**No-Action and Other Projects**
Water Temperature	The Upper Guadalupe River Project and the Guadalupe River Project with Bypass System Alternative would result in a combined postproject temperature increase of 6.5 °F in the upstream portion of Segment 3B. Downstream from Coleman Avenue and through Reach A, combined postproject water temperatures would be no different than for the Guadalupe River Project with Bypass System Alternative alone. Under postmitigation conditions, shade provided by plantings of SRA cover vegetation would reduce water temperatures below preproject levels in Reach A, upstream from I-280, and in Guadalupe Creek, which would be a beneficial effect. Water temperatures in Segments 1, 2 and 3 would be slightly elevated compared to preproject conditions. The cumulative changes in postproject water temperatures are considered less than significant because postmitigation water temperatures would be reduced to preproject levels or below for most of the Guadalupe River watershed. (LS) Changes in water temperature may change the suitability of the affected channel reaches for aquatic species. Cumulative impacts on aquatic species are discussed in Section 6.2.7.	No significant indirect or cumulative impacts on water temperature are expected as a result of the incremental impacts of the No-Action Alternative. (LS)
Dissolved Oxygen	Projects in the Guadalupe River watershed would result in a maximum decrease in dissolved oxygen concentrations of approximately 0.6 mg/L. This impact is considered less than significant because the decrease is within the natural range of daily variations in dissolved oxygen. (LS)	No change from existing conditions. (NE)
6.2.5 BIOLOGICAL RESOURCES – VEGETATION		
Riparian Vegetation	The Upper and Lower Guadalupe River Projects in combination with the Guadalupe River Project with Bypass System Alternative could affect up to 27 acres of riparian habitat. Because of the mitigation for riparian losses, no significant indirect or cumulative impacts are expected. (LS) The Upper and Lower Guadalupe River Projects in combination with Refined Bypass System Alternative could affect slightly less than 27 acres of riparian habitat. Because of the mitigation for riparian losses, no significant indirect or cumulative impacts are expected. (LS)	Loss of 8.36 acres of riparian vegetation would be fully compensated for by the 21.0 acres of mitigation plantings and ongoing monitoring. (LS)

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TABLE 6.4-1. (Continued)

Resource and Issues	Impact and Environmental Commitment	
	Bypass System Alternative and Other Projects[a]/ Refined Bypass System Alternative and Other Projects	**No-Action and Other Projects**
Shaded Riverine Aquatic (SRA) Cover Vegetation	Projects in the Guadalupe River watershed would result in the loss of approximately 14,100 lf of SRA cover vegetation. This loss would be fully mitigated by the establishment of SRA cover vegetation that replaces the function and value of habitat lost. (LS)	A total of 4,705 lf of SRA cover vegetation would be planted as compensation for the loss of 4,526 lf from the No-Action Alternative. Additionally, a HEP analysis would be conducted to determine the need for any additional plantings. The No-Action Alternative would therefore not contribute to potential cumulative impacts. (LS)
Wetlands	The Guadalupe River Project with Bypass System Alternative or with Refined Bypass System Alternative would have no effect on wetlands and would therefore not contribute to potential cumulative impacts. The wetland impacts of other projects in the Guadalupe River watershed would be fully mitigated. (LS)	No wetlands would be affected by the No-Action Alternative. The No-Action Alternative would therefore not contribute to potential cumulative impacts. (NE)
Alviso Slough – Salt Marsh and Wetlands	The combined Guadalupe River Project with Bypass System Alternative or with Refined Bypass System Alternative and Upper Guadalupe River Project would not result in changes to inundation of slough benches. No significant cumulative impacts on marsh habitat in Alviso Slough would occur. (NE) Depending on the flood protection elements constructed for the Lower Guadalupe River Project, the depth, frequency, and duration of inundation of slough benches may or may not change after construction of the Lower Guadalupe River Project. The EIR/EIS for the Lower Guadalupe River Project would analyze the cumulative effects of the Lower Guadalupe River Project in combination with other major projects in the watershed.	Cumulative impacts of the No-Action Alternative and other projects in the Guadalupe River watershed would be similar to the cumulative impacts identified for the Guadalupe River Project with Bypass System Alternative. (NE)
Salt Evaporation Ponds	The combined Guadalupe River Project with Bypass System Alternative or with Refined Bypass System Alternative and Upper Guadalupe River Project would not result in changes to flooding of salt evaporation ponds. No significant cumulative impacts on salt evaporation ponds would occur. (NE) Depending on the flood protection elements constructed for the Lower Guadalupe River Project, the depth, frequency, and duration of inundation of salt evaporation ponds may or may not change after construction of the Lower Guadalupe River Project. The EIR/EIS for the Lower Guadalupe River Project would analyze the cumulative effects of the Lower Guadalupe River Project in combination with other major projects in the watershed.	Cumulative impacts of the No-Action Alternative and other projects in the Guadalupe River watershed would be similar to the cumulative impacts identified for the Guadalupe River Project with Bypass System Alternative. (NE)

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TABLE 6.4-1. (Continued)

	Impact and Environmental Commitment	
Resource and Issues	**Bypass System Alternative and Other Projects[a]/ Refined Bypass System Alternative and Other Projects**	**No-Action and Other Projects**
6.2.6 BIOLOGICAL RESOURCES – WILDLIFE		
Disturbance from Humans	The cumulative increase in wildlife disturbance resulting from human activities is less than significant because wildlife along the entire length of the Guadalupe River are already subjected to substantial disturbance from recreational use and urban activities adjacent to the project areas. Urban and recreational disturbances would increase even in the absence of the major flood protection projects. In addition, the recreational trails and vegetation protection plan would help to concentrate the recreational use in specific corridors that are outside wildlife habitat areas. (LS)	Cumulative impacts of the No-Action Alternative and other projects in the Guadalupe River watershed would be similar to the cumulative impacts identified for the Guadalupe River Project with Bypass System Alternative. (LS)
Disturbance of California Red-Legged Frog	Projects in the Guadalupe River watershed would not affect the red-legged frog or habitat critical to its continued existence because the red-legged frog does not occur in areas affected by the projects. (NE)	Cumulative impacts of the No-Action Alternative and other projects in the Guadalupe River watershed would be similar to the cumulative impacts identified for the Guadalupe River Project with Bypass System Alternative. (NE)
Disturbance of Western Snowy Plover	No significant cumulative impacts on the western snowy plover would occur as a result of the Guadalupe River Project with Bypass System Alternative or with Refined Bypass System Alternative and the Upper Guadalupe River Project. (NE) Corps and SCVWD for the Guadalupe River Project with Bypass System Alternative would ensure that floodwaters are pumped out of salt evaporation pond A8D between the months of January and May. (B) Corps and SCVWD for the Guadalupe River Project with Bypass System Alternative would monitor floodflows and surface-water levels in Alviso Slough and in evaporation pond A8D. The monitoring program would be coordinated with USFWS.	Cumulative impacts of the No-Action Alternative and other projects in the Guadalupe River watershed would be similar to the cumulative impacts identified for the Guadalupe River Project with Bypass System Alternative. (NE)

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TABLE 6.4-1. (Continued)

Resource and Issues	Impact and Environmental Commitment	
	Bypass System Alternative and Other Projects[a]/ Refined Bypass System Alternative and Other Projects	**No-Action and Other Projects**
Disturbance of California Clapper Rail	No significant cumulative impacts on the California clapper rail would occur as a result of the Guadalupe River Project with Bypass System Alternative or with Refined Bypass Alternative and the Upper Guadalupe River Project. (NE) Corps and SCVWD would monitor clapper rail habitat in the Alviso Slough area to determine whether the habitat in the salt marsh changes after construction of the Guadalupe River Project with Bypass System Alternative or with Refined Bypass System Alternative. Monitoring would focus on dominant plant species and habitat types in Alviso Slough and floodflows, surface-water levels, and salinity in Alviso Slough. The monitoring program would be coordinated with USFWS.	Cumulative impacts of the No-Action Alternative and other projects in the Guadalupe River watershed would be similar to the cumulative impacts identified for the Guadalupe River Project with Bypass System Alternative. (NE)
Disturbance of Salt Marsh Harvest Mouse	No significant cumulative impacts on the salt marsh harvest mouse would occur as a result of the Guadalupe River Project with Bypass System Alternative, Refined Bypass System Alternative, and Upper Guadalupe River Project. (NE) Corps and SCVWD would monitor salt marsh harvest mouse habitat in the Alviso Slough area to determine whether the habitat in the salt marsh changes as a result of construction of the Guadalupe River Project with Bypass System Alternative or with Refined Bypass System Alternative. Monitoring would focus on dominant plant species and habitat types in Alviso Slough and floodflows, surface-water levels, and salinity in Alviso Slough. The monitoring program would be coordinated with USFWS.	Cumulative impacts of the No-Action Alternative and other projects in the Guadalupe River watershed would be similar to the cumulative impacts identified for the Guadalupe River Project with Bypass System Alternative. (NE)

6.2.7 BIOLOGICAL RESOURCES – FISH

Hydrologic and Hydraulic Effects	Projects in the Guadalupe River watershed would not affect the timing, magnitude, frequency, and duration of low- to medium-range flows; depth and velocity conditions needed to support fish migration, spawning, and rearing would therefore not be substantially affected. Velocities in the bypasses would not result in adverse effects on migrating anadromous fish. (LS)	Cumulative impacts of the No-Action Alternative and other projects in the Guadalupe River watershed would be similar to the cumulative impacts identified for the Guadalupe River Project with Bypass System Alternative. (LS)

NOTES: NE = NO EFFECT LS = LESS-THAN-SIGNIFICANT ADVERSE EFFECT S = SIGNIFICANT ADVERSE EFFECT B = BENEFICIAL EFFECT

TABLE 6.4-1. (Continued)

Resource and Issues	Impact and Environmental Commitment	
	Bypass System Alternative and Other Projects[a]/ Refined Bypass System Alternative and Other Projects	**No-Action and Other Projects**
Channel Erosion and Deposition	Projects in the Guadalupe River watershed include channel features that will protect the channel from erosion, including invert stabilization structures, rock weirs, and biotechnical bank stabilizers. Channel-maintenance flows and gravel-flushing flows will remain in the natural channel to maintain channel form and gravel quality. Therefore, the depth of riffles, flow velocity in riffle areas, spawning gravel occurrence, and the distribution and structure of pools, riffles, runs, and backwaters in the Guadalupe River watershed are not expected to be substantially affected by erosion and deposition. (LS)	Cumulative impacts of the No-Action Alternative and other projects in the Guadalupe River watershed would be similar to the cumulative impacts identified for the Guadalupe River Project with Bypass System Alternative. (LS)
Geomorphology	Projects in the Guadalupe River watershed include grading, channel widening, and channel armoring activities that would affect fish habitat, including gravels and the distribution and structure of pools, riffles, runs, and backwaters. Low-flow channel structures in areas of river-bottom armoring, invert stabilization structures in the natural channel, spawning gravel replacement, SRA cover vegetation replacement, and other environmental commitments would reestablish fish habitat values. Cumulative adverse impacts on anadromous fish migration, spawning gravel, and rearing habitat in the Guadalupe River watershed would be avoided, minimized, and mitigated. (LS) Cumulative impacts are potentially beneficial to anadromous species because the Upper Guadalupe River Project would provide access to an additional 10.9 miles of spawning and rearing habitat on Alamitos and Guadalupe Creeks. (B)	Cumulative impacts of the No-Action Alternative and projects in the Guadalupe River watershed would be characterized by continued decreases in bank and bed stability in Segments 1, 2, and 3. This would be a less-than-significant impact because it would not change the existing river morphology in the project area of the No-Action Alternative. (LS)
Suspended Solids and Toxic Constituents	Cumulative impacts of suspended solids and toxic constituents on fish species in the Guadalupe River would be avoided though implementation of project-specific SWPPPs, erosion and sediment control plans, and toxic materials control and spill-response plans. Projects in the Guadalupe River watershed would also not affect the source or input of mercury into the system. The flood protection projects and the Guadalupe Creek Restoration Project would discourage the development of instream conditions such as wetlands or other anoxic, high sulfate, low pH, and high organic matter aquatic environments that would be conducive to enhanced methylation. Cumulative adverse effects on fish species and aquatic organisms would be less than significant.	Cumulative impacts of the No-Action Alternative and other projects in the Guadalupe River watershed would be similar to the cumulative impacts identified for the Guadalupe River Project with Bypass System Alternative. (LS)

NOTES: NE = NO EFFECT LS = LESS-THAN-SIGNIFICANT ADVERSE EFFECT S = SIGNIFICANT ADVERSE EFFECT B = BENEFICIAL EFFECT

TABLE 6.4-1. (Continued)

Resource and Issues	Impact and Environmental Commitment	
	Bypass System Alternative and Other Projects[a]/ Refined Bypass System Alternative and Other Projects	**No-Action and Other Projects**
Water Temperature	Removal of SRA cover vegetation during construction of projects in the Guadalupe River watershed would temporarily increase water temperatures in the Guadalupe River downstream from Almaden Lake. The cumulative impact would be less than significant because the incremental change in water temperatures would be relatively small, especially from October through May, when most anadromous fish life stages are present; water temperatures during the summer months would be within the range that would support rearing of juvenile steelhead; and the stream length affected by the incremental change is relatively small. (LS) Under postmitigation conditions, the long-term cumulative reduction in water temperatures as a result of planted SRA cover vegetation associated with projects in the Guadalupe River watershed would benefit anadromous species in Guadalupe Creek and in the Guadalupe River. This incremental decrease in water temperatures would improve conditions for chinook salmon and steelhead, especially from June through October. (B) The cumulative impact of temporary increases in water temperatures on dissolved oxygen concentrations is less than significant because levels of dissolved oxygen would remain within the natural range of daily variations in dissolved oxygen. (LS)	The cumulative impact on water temperatures of the Upper Guadalupe River Project and the No-Action Alternative would consist of the potential elevation of water temperatures in the downtown project area above the temperatures that would occur if only the No-Action Alternative were selected. This temperature increase would be less than expected for the Bypass System Alternative because less SRA cover vegetation would be removed under the No-Action Alternative. The potential temperature increase would be mitigated by the incremental decrease in temperatures expected once mitigation plantings for the Upper Guadalupe River Project have reached maturity. (LS)
SRA Cover	The planting of SRA cover vegetation and the installation of instream cover features would reestablish cover and rearing areas and reduce cumulative adverse impacts on resident and anadromous fish rearing to less-than-significant levels. (LS) SRA cover establishment in Guadalupe Creek would increase the amount of rearing and spawning habitat for anadromous fish in the upper tributaries of the Guadalupe River watershed. (B)	Cumulative impacts of the No-Action Alternative and other projects in the Guadalupe River watershed would be similar to the cumulative impacts identified for the Guadalupe River Project with Bypass System Alternative. (LS)
6.2.8 LAND USE AND PLANNING		
Land Use	The Guadalupe River Project with Bypass System Alternative would not change existing land uses and is compatible with surrounding land uses. Therefore, the Guadalupe River Project with Bypass System Alternative would not contribute to ongoing regional impacts associated with development or other land use conversions. (NE)	Cumulative impacts of the No-Action Alternative and other projects in the Guadalupe River watershed would be similar to the cumulative impacts identified for the Guadalupe River Project with Bypass System Alternative. (NE)

NOTES: NE = NO EFFECT LS = LESS-THAN-SIGNIFICANT ADVERSE EFFECT S = SIGNIFICANT ADVERSE EFFECT B = BENEFICIAL EFFECT

TABLE 6.4-1. (Continued)

Resource and Issues	Impact and Environmental Commitment	
	Bypass System Alternative and Other Projects[a]/ Refined Bypass System Alternative and Other Projects	**No-Action and Other Projects**
6.2.9 RECREATION, PUBLIC ACCESS, AND VISUAL RESOURCES		
Recreation	The Guadalupe River Project with Bypass System Alternative or with Refined Bypass System Alternative and other projects in the Guadalupe watershed could affect recreational opportunities along the river corridor during construction. This cumulative impact is considered less than significant because construction of the projects would not occur simultaneously and the projects would not directly affect parks or other formal river access points. (LS)	Cumulative impacts of the No-Action Alternative and other projects in the Guadalupe River watershed would be similar to the cumulative impacts identified for the Guadalupe River Project with Bypass System Alternative. (LS)
Public Safety	Public safety would be protected by appropriate safety measures during construction and operation, including limiting public access to the channel. (LS)	Public safety would be protected by appropriate safety measures during construction and operation, including limiting public access to the channel. (LS)
Boating	The flood protection projects in the Guadalupe River watershed are not expected to substantially change water-dependent recreation opportunities in the river. (LS)	The flood protection projects in the Guadalupe River watershed are not expected to substantially change water-dependent recreation opportunities in the river. (LS)
Visual Resources	Projects in the Guadalupe River watershed would affect the visual character of the river corridor by removing riparian vegetation and constructing flood protection facilities. Successful implementation of revegetation onsite and offsite would restore and in some cases enhance the aesthetic character of the riparian corridor. (LS)	Cumulative impacts of the No-Action Alternative and other projects in the Guadalupe River watershed would be similar to the cumulative impacts identified for the Guadalupe River Project with Bypass System Alternative. (LS)

NOTES: NE = NO EFFECT LS = LESS-THAN-SIGNIFICANT ADVERSE EFFECT S = SIGNIFICANT ADVERSE EFFECT B = BENEFICIAL EFFECT

TABLE 6.4-1. (Continued)

	Impact and Environmental Commitment	
Resource and Issues	**Bypass System Alternative and Other Projects[a]/ Refined Bypass System Alternative and Other Projects**	**No-Action and Other Projects**
6.2.10 TRANSPORTATION AND TRAFFIC		
Roadway Capacity	The overlap between the construction periods for the Guadalupe River Project with Bypass System Alternative or with Refined Bank System Alternative and State Route 87 in 2001 would cause short-term cumulative impacts on traffic. However, these impacts would not be substantial because project-specific traffic mitigation measures have been developed for the Guadalupe River Project with Bypass System Alternative and with Refined Bypass System Alternative and because only a small number of truck trips would occur during peak hours. (LS) No long-term cumulative impacts on traffic are expected because the Guadalupe River Project with Bypass System Alternative or with Refined Bypass System Alternative would generate a minimal number of vehicle trips. (LS)	Cumulative impacts of the No-Action Alternative and other projects in the Guadalupe River watershed would be similar to the cumulative impacts identified for the Guadalupe River Project with Bypass System Alternative. (LS)
6.2.11 AIR QUALITY		
Construction	Standard construction-period mitigation measures required by BAAQMD for all projects in the Guadalupe River watershed would prevent significant cumulative emissions of dust and equipment exhaust and would ensure that emissions would not conflict with BAAQMD's 1997 Clean Air Plan and its 1999 Ozone Attainment Plan. (LS)	Cumulative impacts of the No-Action Alternative and other projects in the Guadalupe River watershed would be similar to the cumulative impacts identified for the Guadalupe River Project with Bypass System Alternative. (LS)
Operation	The Guadalupe River Project with Bypass System Alternative or with Refined Bypass System Alternative would not have any operational impacts on air quality. No indirect or cumulative impacts would occur as a result of the incremental effects of the Guadalupe River Project with Bypass System Alternative or with Refined Bypass System Alternative. (NE)	No change from existing conditions. (NE)
6.2.12 NOISE		
Construction	The Guadalupe River Project with Bypass System Alternative or with Refined Bypass System Alternative and other projects in the Guadalupe watershed would result in less-than-significant cumulative impacts on noise because of the lack of noise-sensitive receptors in the area and because all construction would occur during daylight hours. (LS)	Cumulative impacts of the No-Action Alternative and other projects in the Guadalupe River watershed would be similar to the cumulative impacts identified for the Guadalupe River Project with Bypass System Alternative. (LS)

NOTES: NE = NO EFFECT LS = LESS-THAN-SIGNIFICANT ADVERSE EFFECT S = SIGNIFICANT ADVERSE EFFECT B = BENEFICIAL EFFECT

TABLE 6.4-1. (Continued)

	Impact and Environmental Commitment	
Resource and Issues	**Bypass System Alternative and Other Projects[a]/ Refined Bypass System Alternative and Other Projects**	**No-Action and Other Projects**
6.2.13 HAZARDS AND HAZARDOUS MATERIALS		
	The Guadalupe River Project with Bypass System Alternative and with Refined Bypass System Alternative would not contribute to cumulative long-term impacts involving hazardous materials because the projects do not include the long-term use, storage, or disposal of significant quantities of hazardous materials. (NE) Construction activities associated with the Guadalupe River Project with Bypass System Alternative or with Refined Bypass System Alternative would not contribute to impacts on people or the environment from hazardous materials because of the implementation of mitigation measures identified in Section 5.10, "Hazards and Hazardous Materials." (LS)	No hazardous material sites were identified in Segment 3C Phase 2. Cumulative impacts of the No-Action Alternative and other projects in the Guadalupe River watershed would be similar to the Guadalupe River Project with Bypass System Alternative. (LS)
6.2.14 CULTURAL RESOURCES		
	The Guadalupe River Project with Bypass System Alternative or with Refined Bypass System Alternative would not contribute to the cumulative loss of known historic or prehistoric cultural resources in the Guadalupe River watershed because no known sites would be affected by construction. In addition, the Bypass System Alternative would result in a less-than-significant cumulative impact on unknown cultural resources because sites unearthed during construction would be tested and protected or information about the site's properly recorded. (LS)	No cultural resource sites were identified in Segment 3C Phase 2. Cumulative impacts of the No-Action Alternative and other projects in the Guadalupe River watershed would be similar to the Guadalupe River Project with Bypass System Alternative. (LS)

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[a] Eighteen major projects in the Guadalupe River watershed are analyzed in the cumulative impact analysis (Section 6.2.1): Guadalupe River Park Project, State Route 87 Freeway Upgrade Project, State Route 85 Transportation Corridor Project, San Jose International Airport Expansion Plan, Santa Clara Valley Water District Fish Ladder Construction Program, Guadalupe Creek Restoration Project, Upper Guadalupe River Flood Control Project, Lower Guadalupe River Flood Protection Project, Stormwater Pump Installations, Virginia Street Bank Stabilization Project, Santa Clara Valley Water District Stream Maintenance Program, Alviso Ring Levee Mitigation and Restoration Project, Almaden Quicksilver County Park Project, Boston Property Project, John P. McEnery Park Site Improvements, Los Gatos Creek Trial Project, Vasona Light Rail Extension Project, and Core Location Project.

NOTES: NE = NO EFFECT LS = LESS-THAN-SIGNIFICANT ADVERSE EFFECT S = SIGNIFICANT ADVERSE EFFECT B = BENEFICIAL EFFECT

Appendix G

Vegetation Mapping

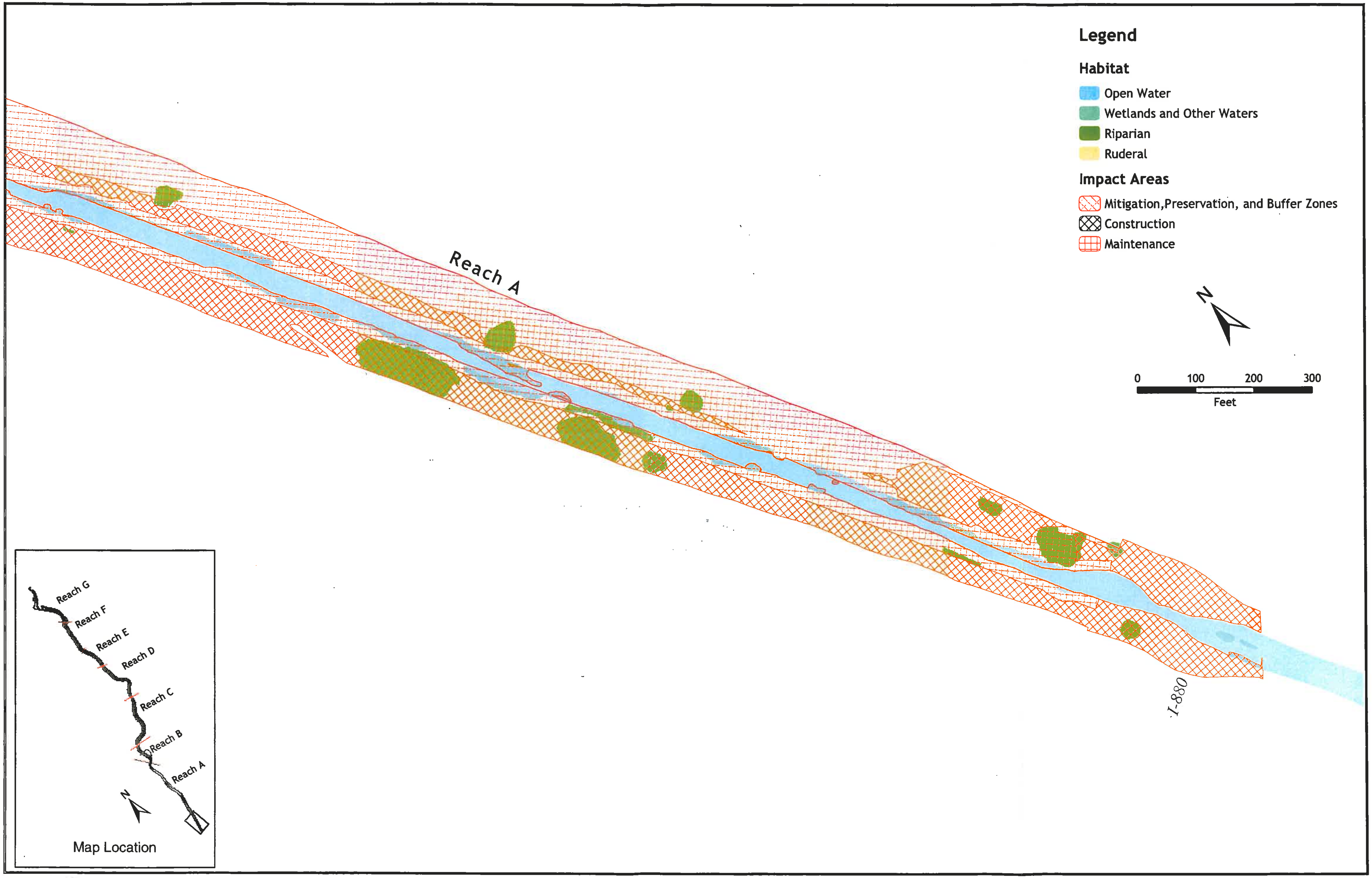

Figure G-1. Alternative 2: Floodwalls/Levee Raise (Proposed Project)
Portion of Reach A
Sheet 1 of 16

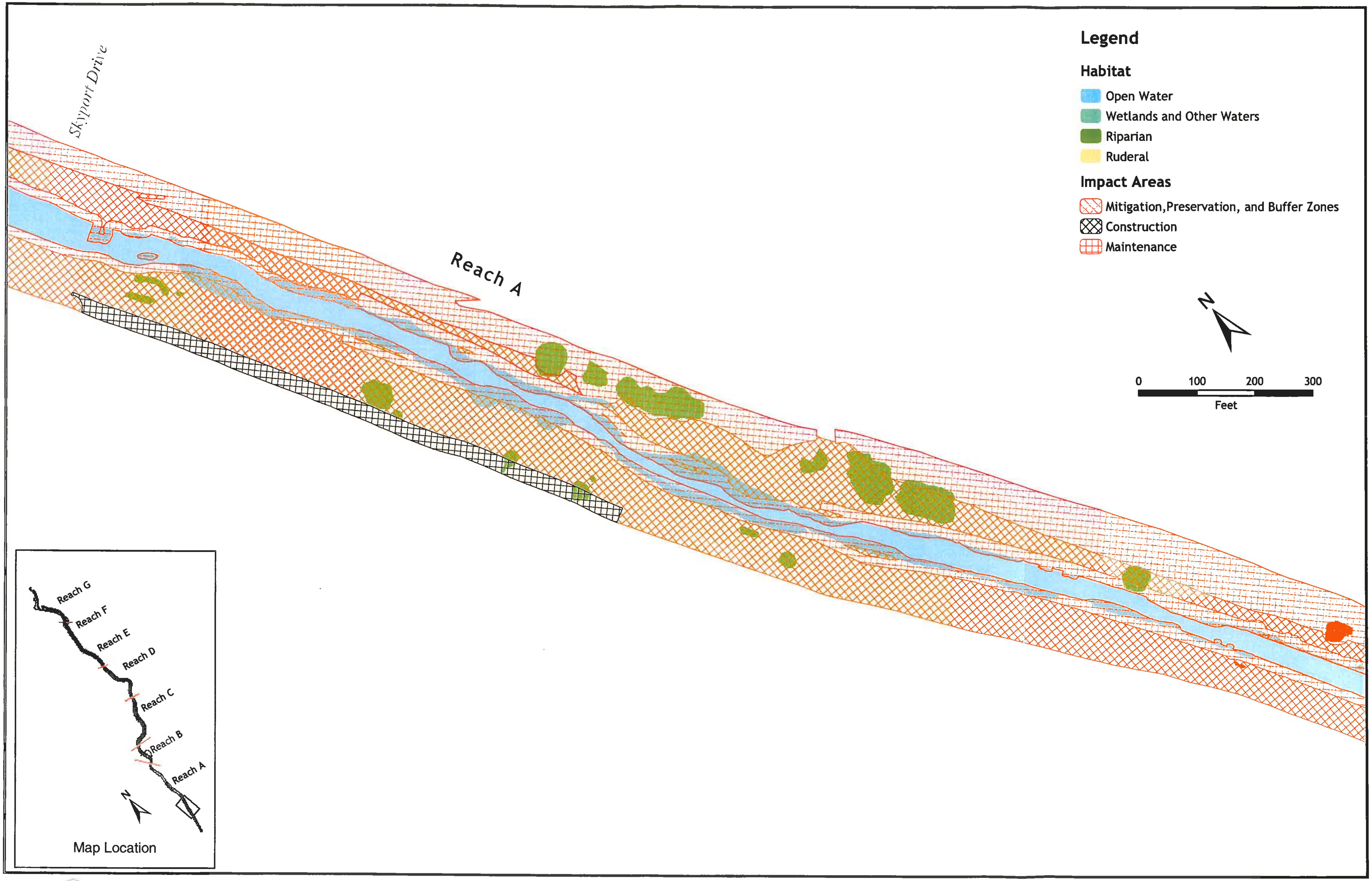

Figure G-1. Alternative 2: Floodwalls/Levee Raise (Proposed Project)
Portion of Reach A
Sheet 2 of 16

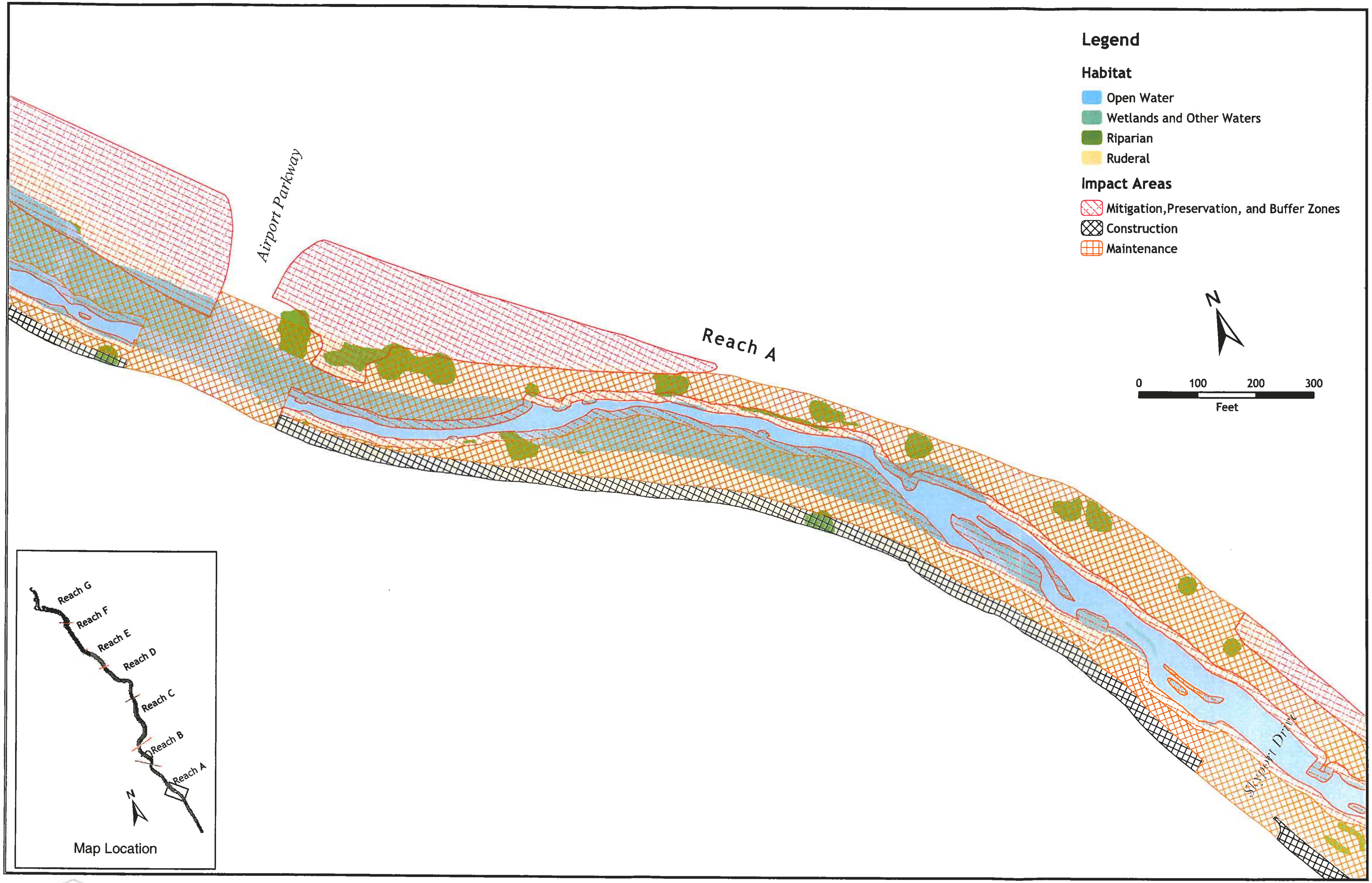

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Figure G-1. Alternative 2: Floodwalls/Levee Raise (Proposed Project)
Portion of Reach A
Sheet 3 of 16

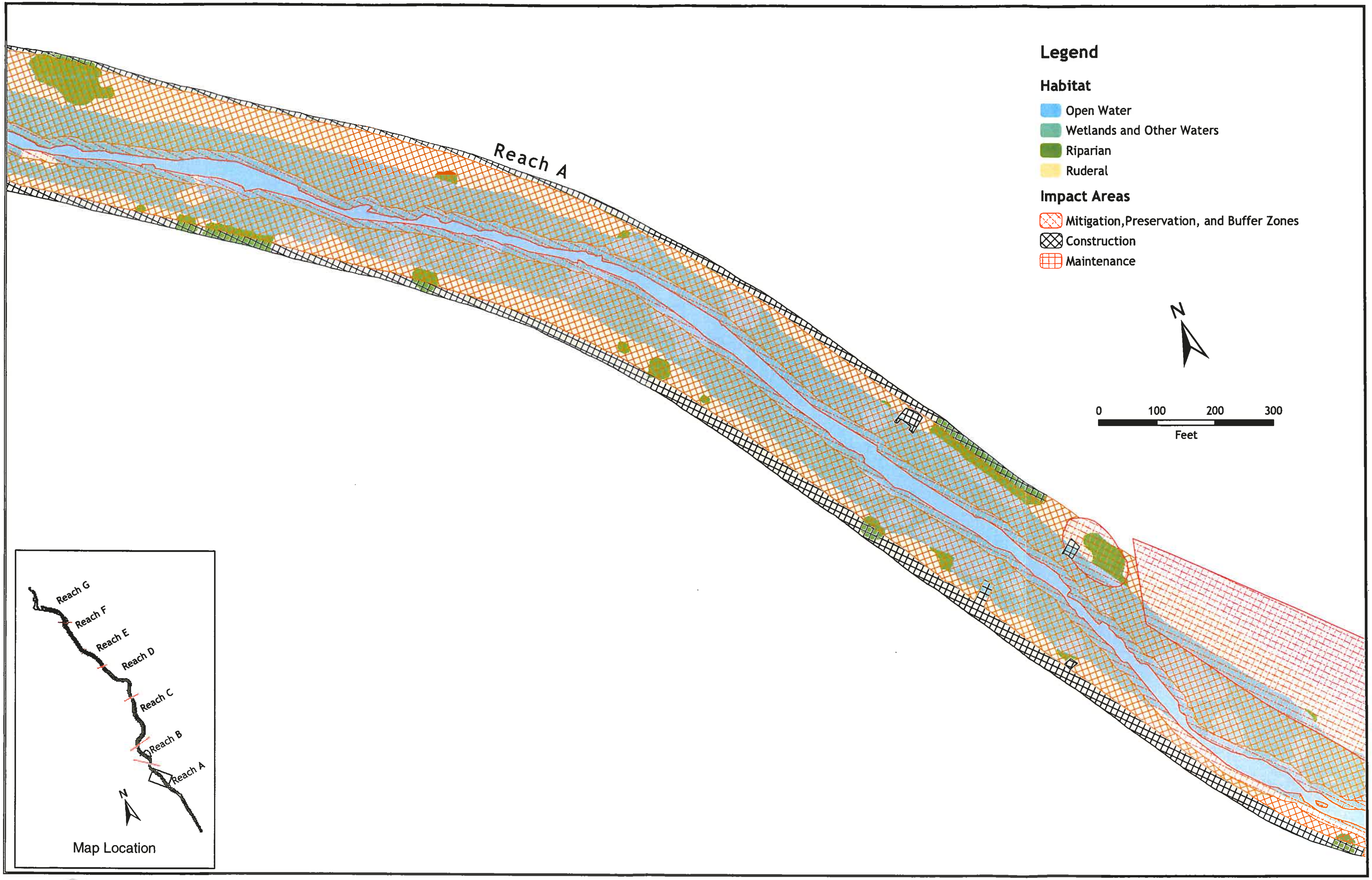

Figure G-1. Alternative 2: Floodwalls/Levee Raise (Proposed Project)
Portion of Reach A
Sheet 4 of 16

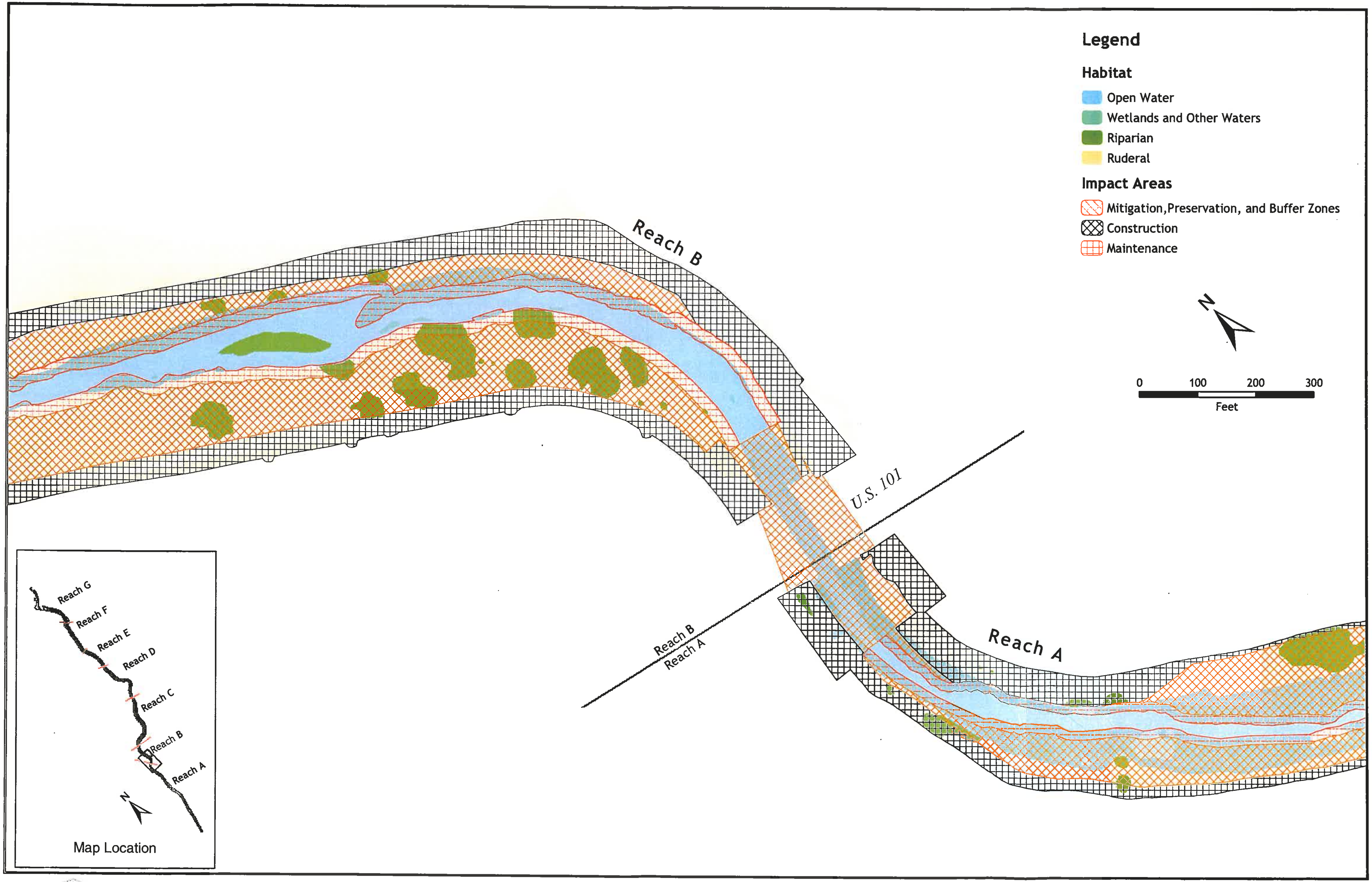

Figure G-1. Alternative 2: Floodwalls/Levee Raise (Proposed Project)
Portion of Reach A and B
Sheet 5 of 16

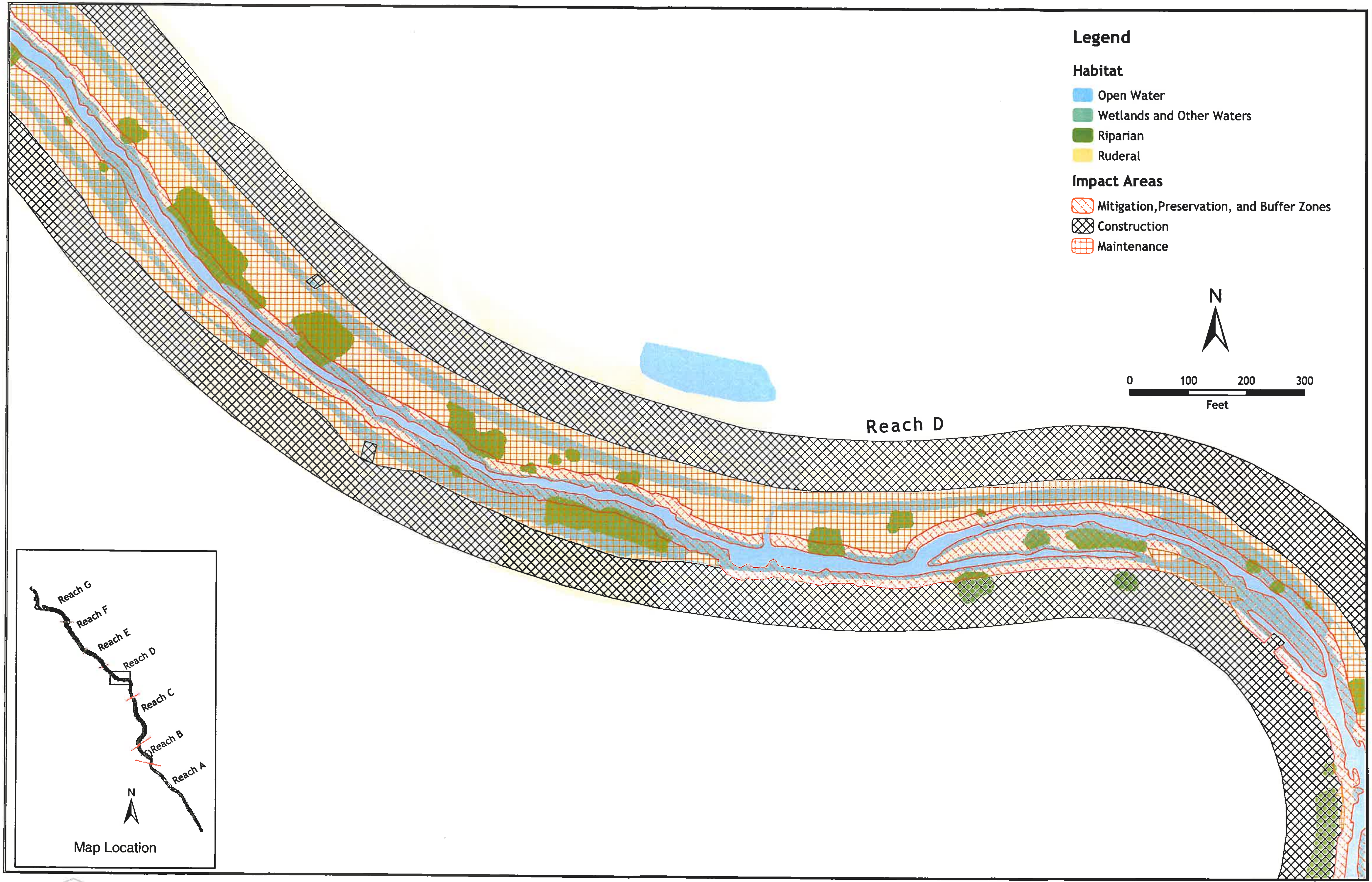

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Figure G-1. Alternative 2: Floodwalls/Levee Raise (Proposed Project)
Portion of Reach D
Sheet 10 of 16

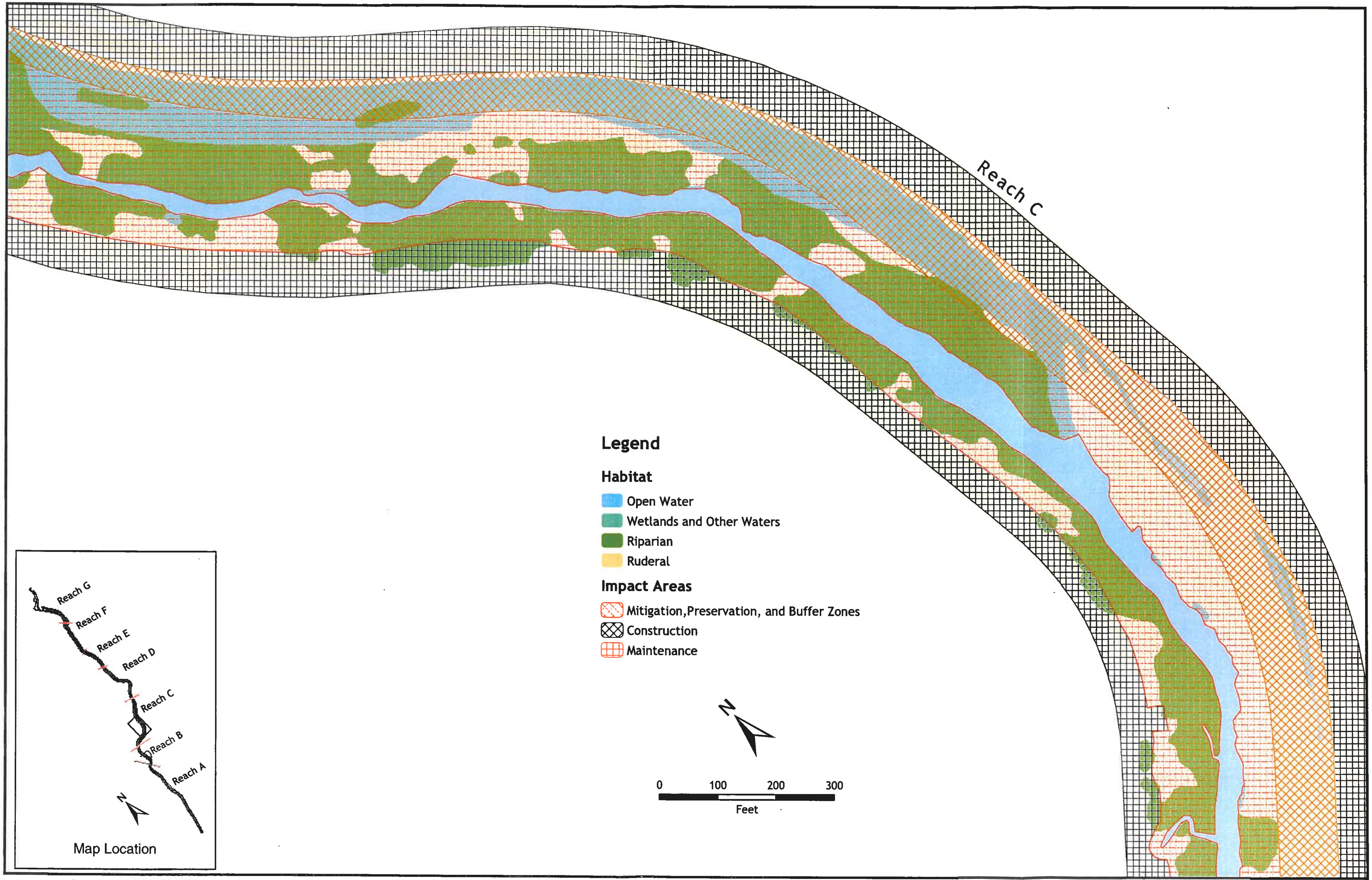

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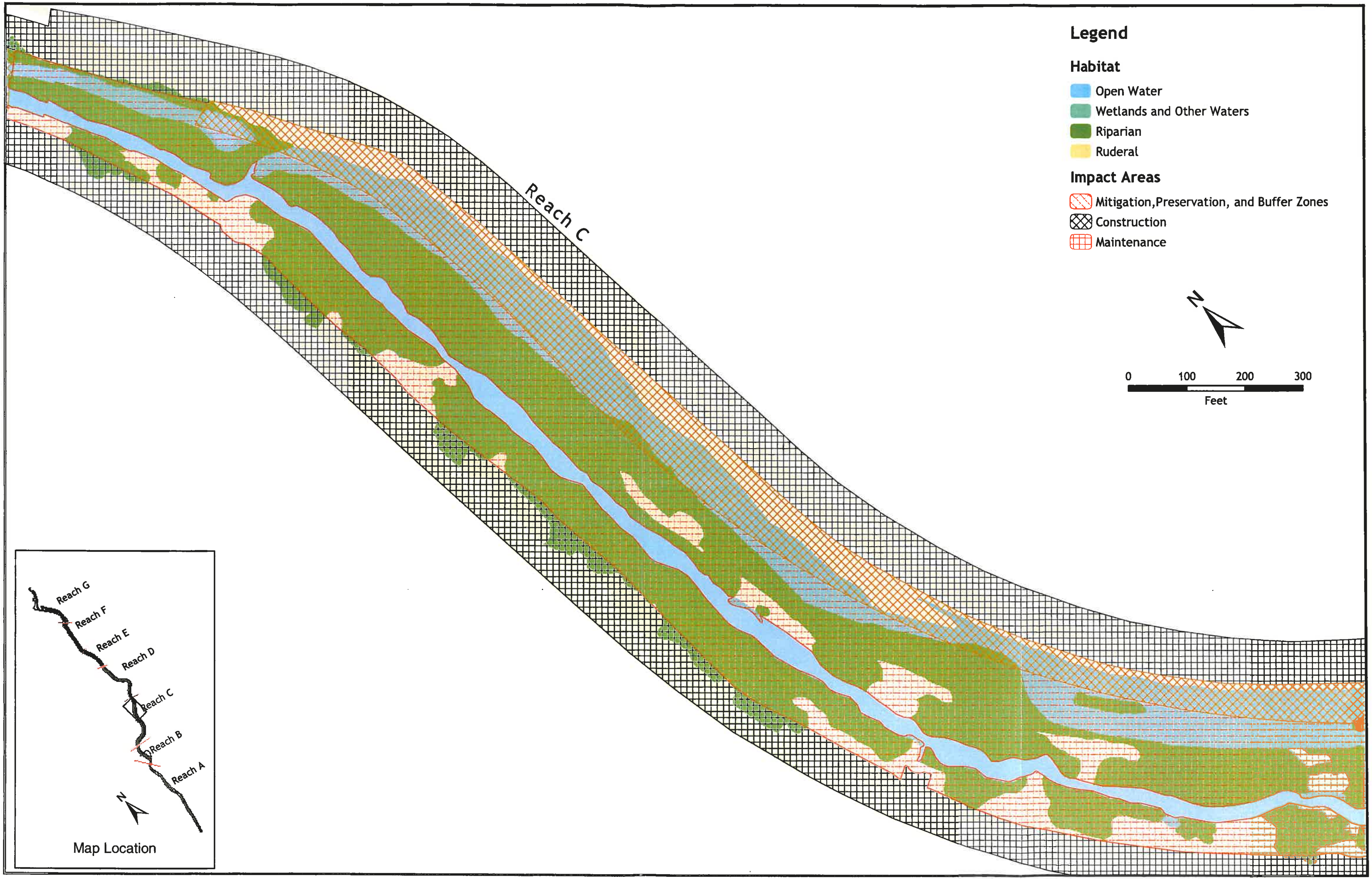
Figure G-1. Alternative 2: Floodwalls/Levee Raise (Proposed Project)
Portion of Reach C
Sheet 7 of 16



Jones & Stokes

Figure G-1. Alternative 2: Floodwalls/Levee Raise (Proposed Project)
Portion of Reach C
Sheet 8 of 16

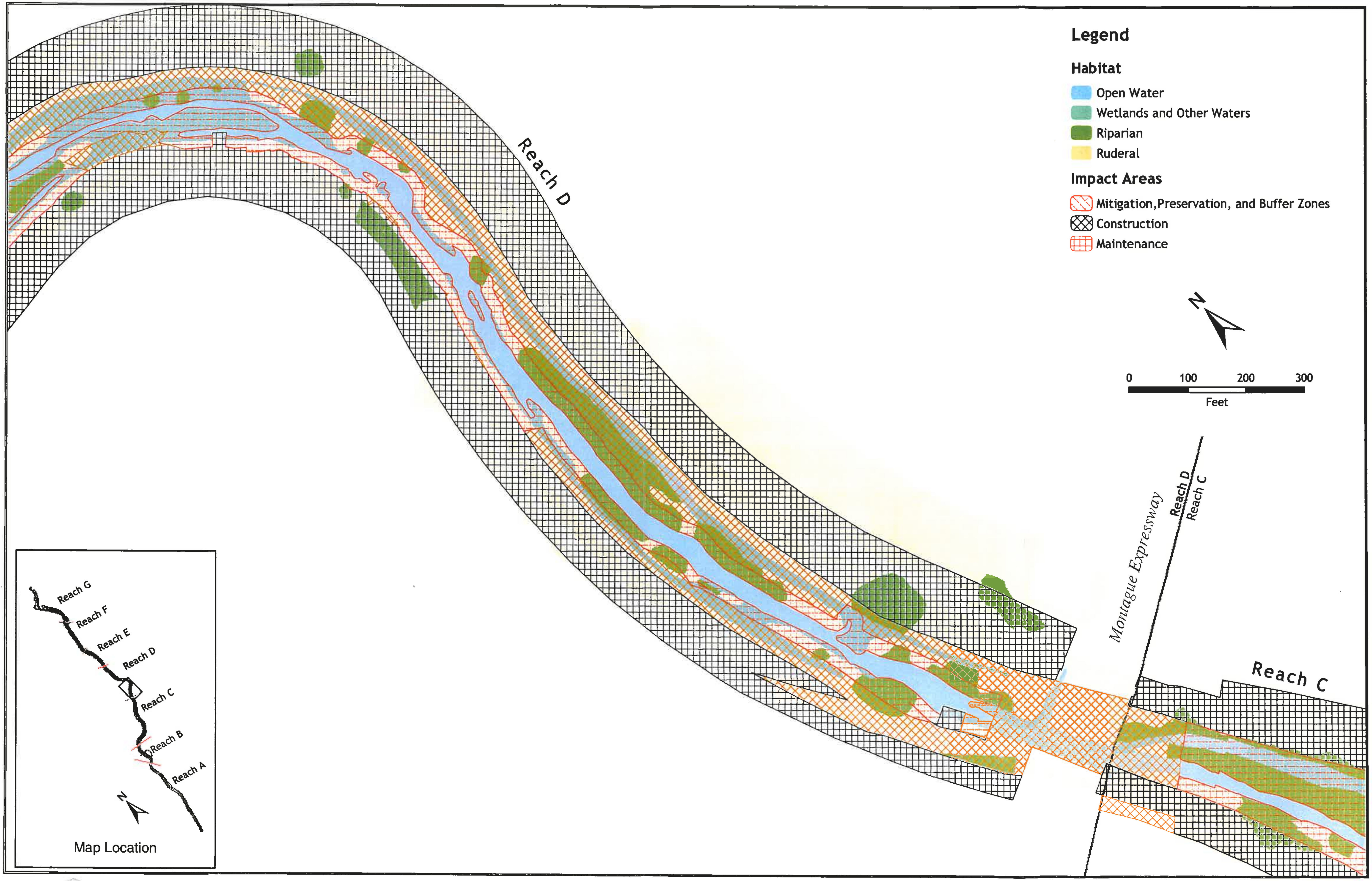


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Figure G-1. Alternative 2: Floodwalls/Levee Raise (Proposed Project)
Portion of Reach C and D
Sheet 9 of 16

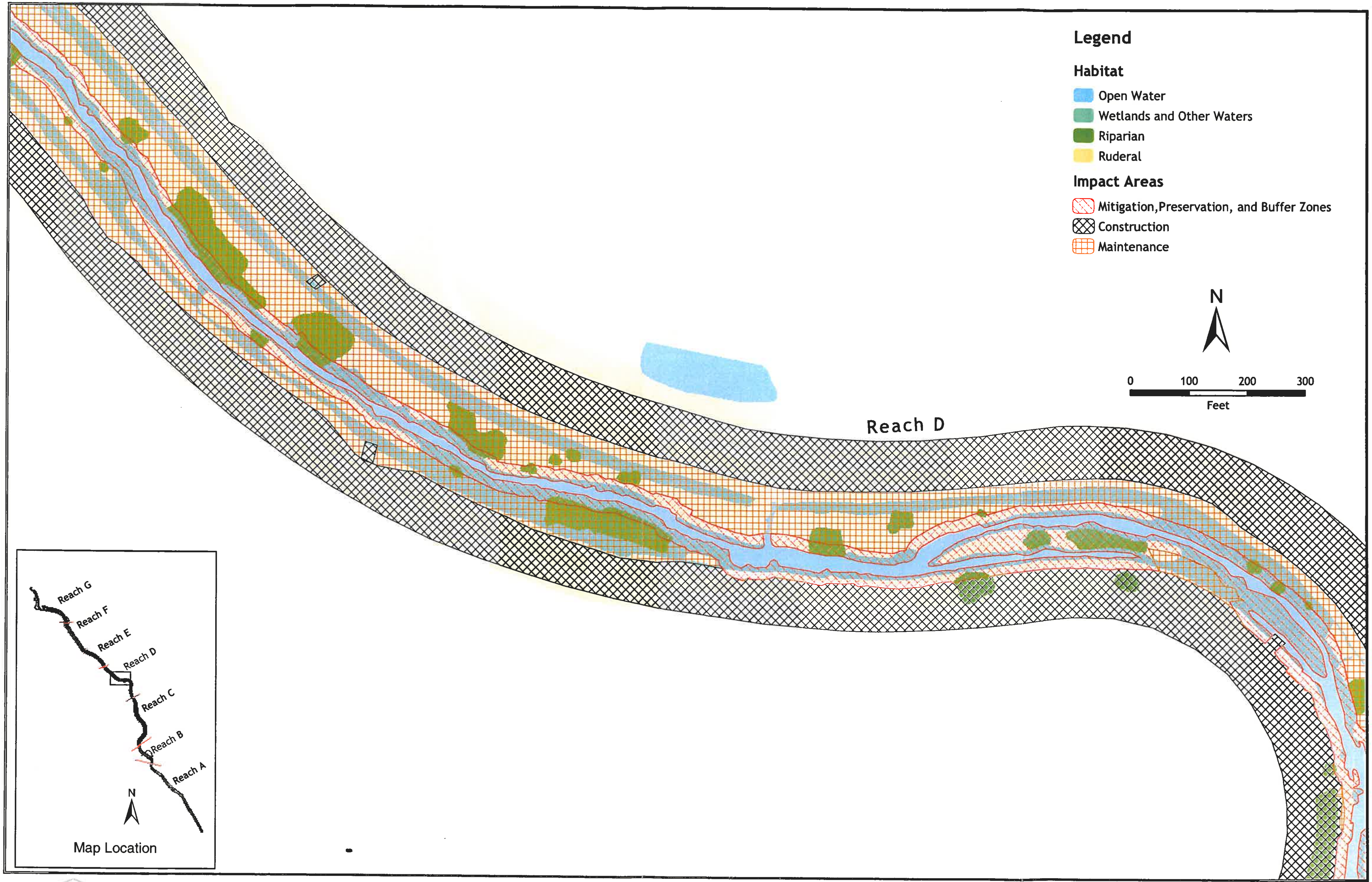

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Figure G-1. Alternative 2: Floodwalls/Levee Raise (Proposed Project)
Portion of Reach D
Sheet 10 of 16

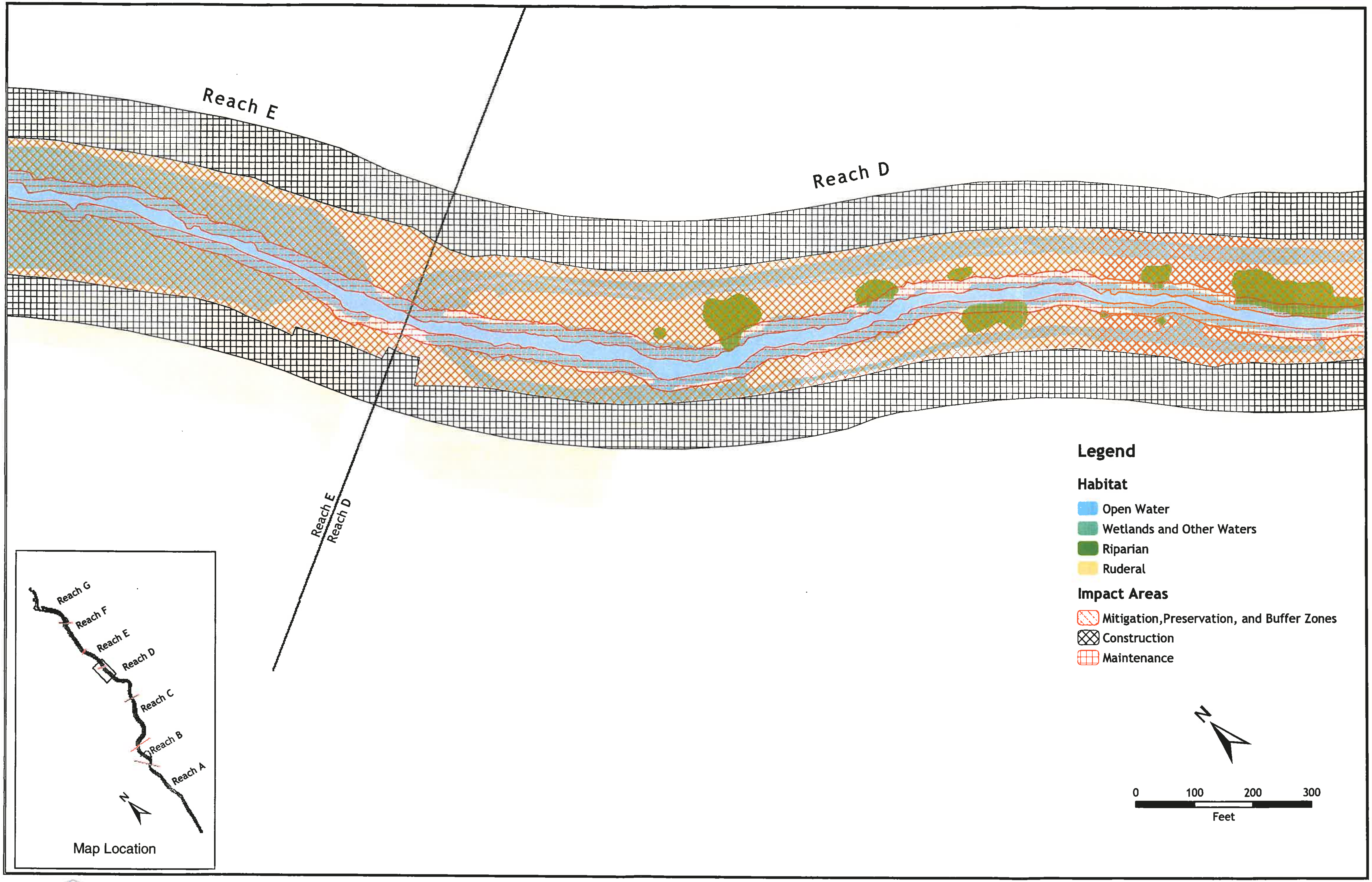

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Figure G-1. Alternative 2: Floodwalls/Levee Raise (Proposed Project)
Portion of Reach D and E
Sheet 11 of 16

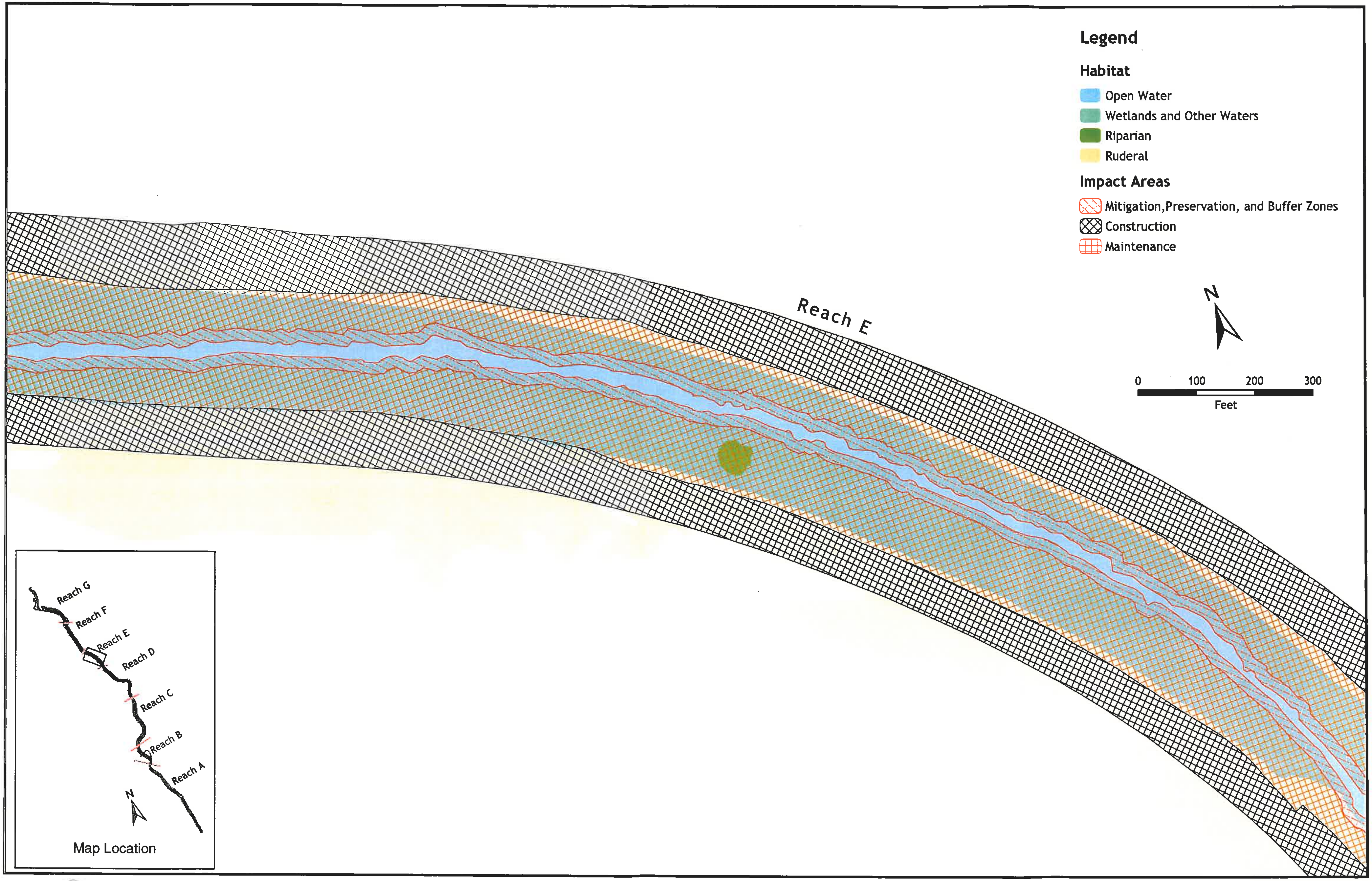

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Figure G-1. Alternative 2: Floodwalls/Levee Raise (Proposed Project)
Portion of Reach E
Sheet 12 of 16

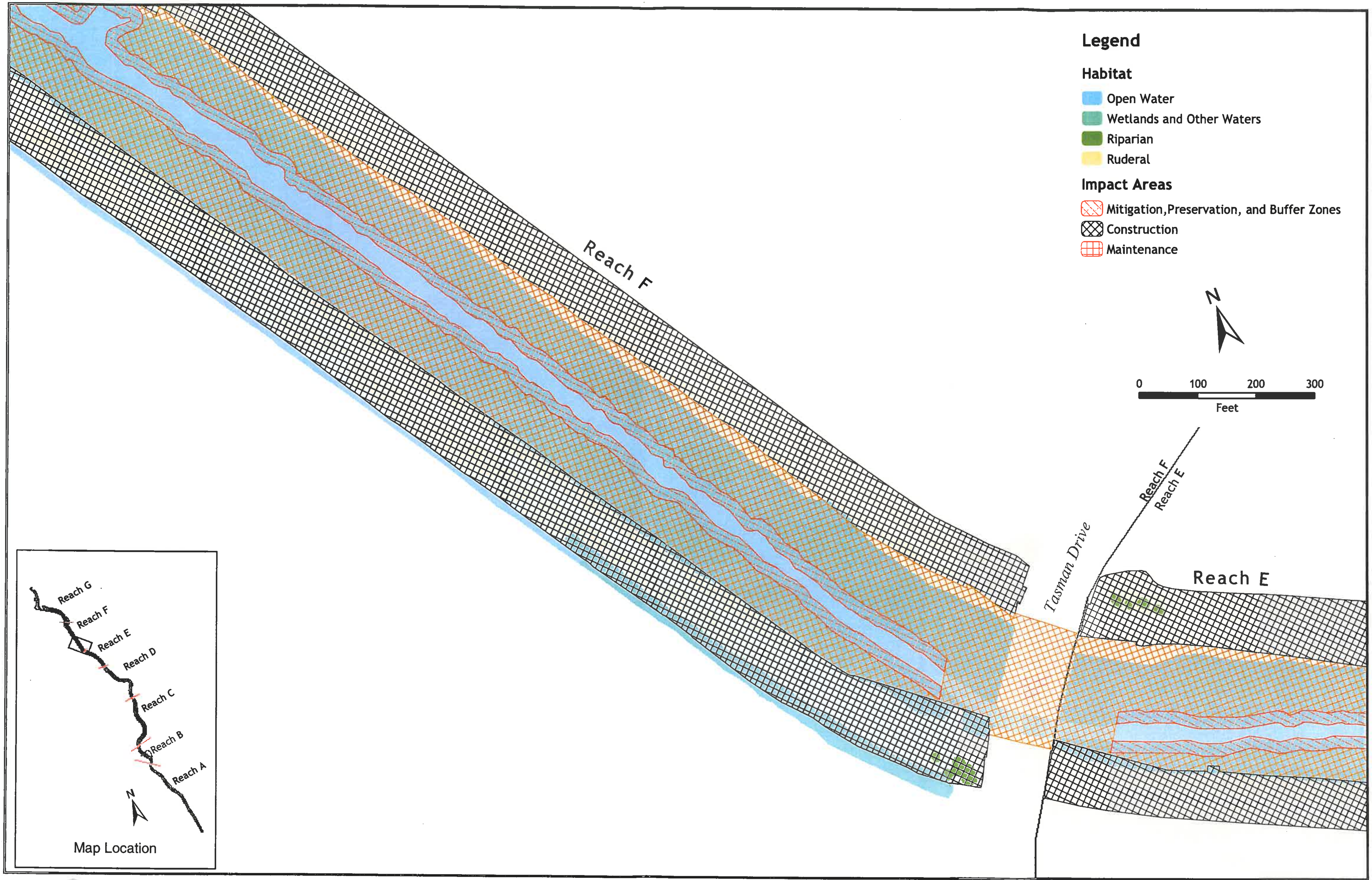

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Figure G-1. Alternative 2: Floodwalls/Levee Raise (Proposed Project)
Portion of Reach E and F
Sheet 13 of 16

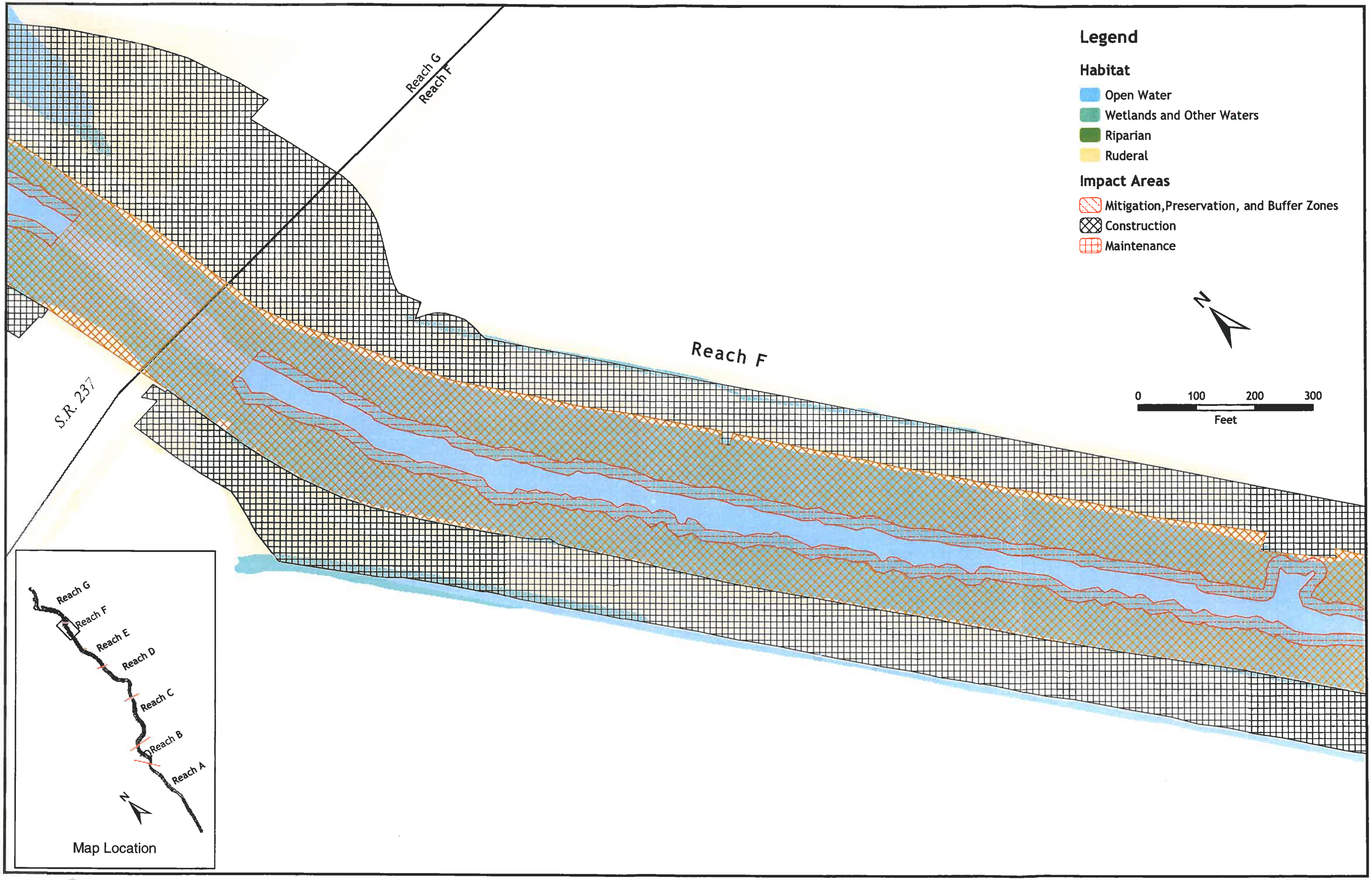

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Figure G-1. Alternative 2: Floodwalls/Levee Raise (Proposed Project)
Portion of Reach F
Sheet 14 of 16

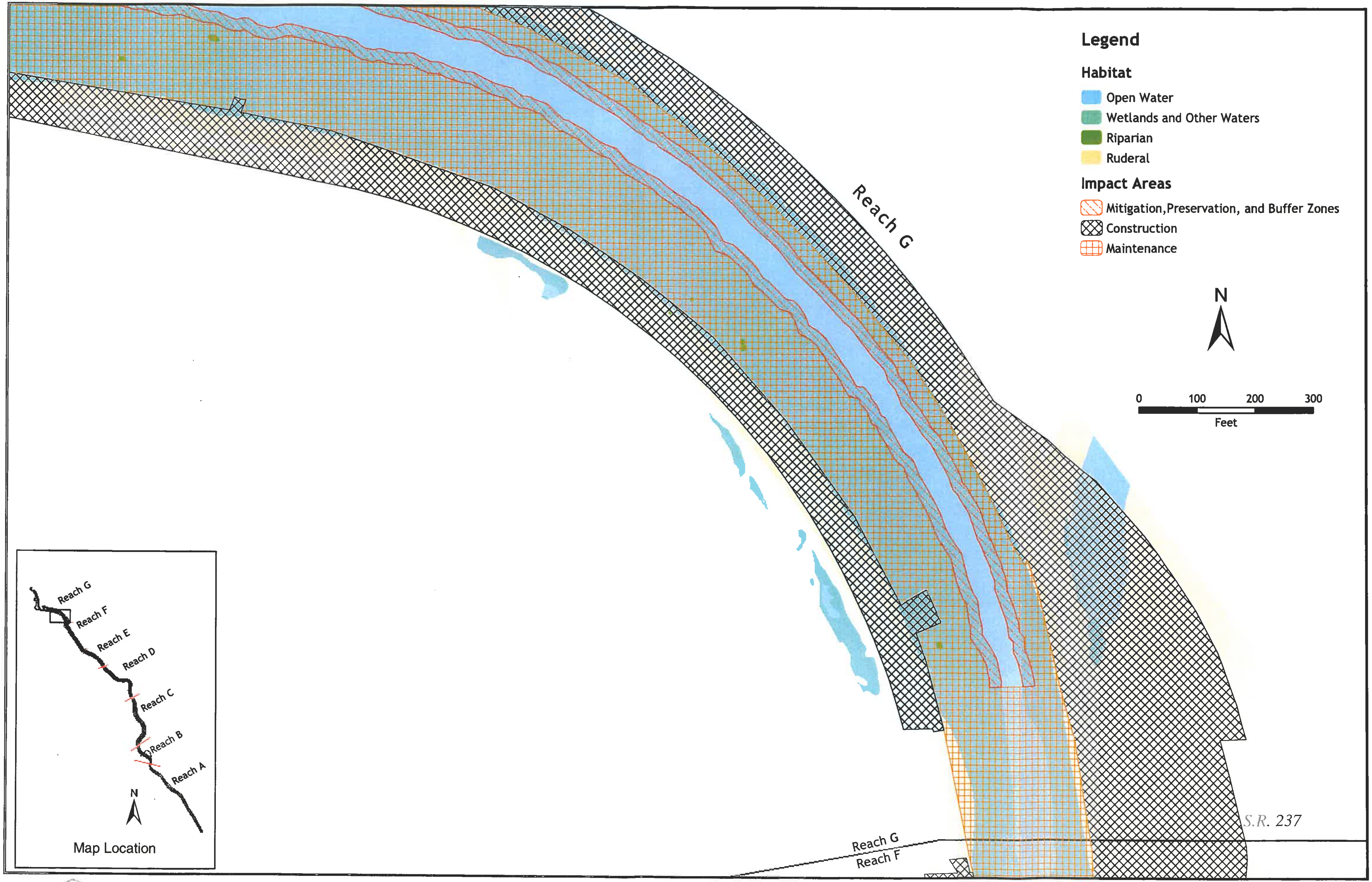

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Figure G-1. Alternative 2: Floodwalls/Levee Raise (Proposed Project)
Portion of Reach G
Sheet 15 of 16

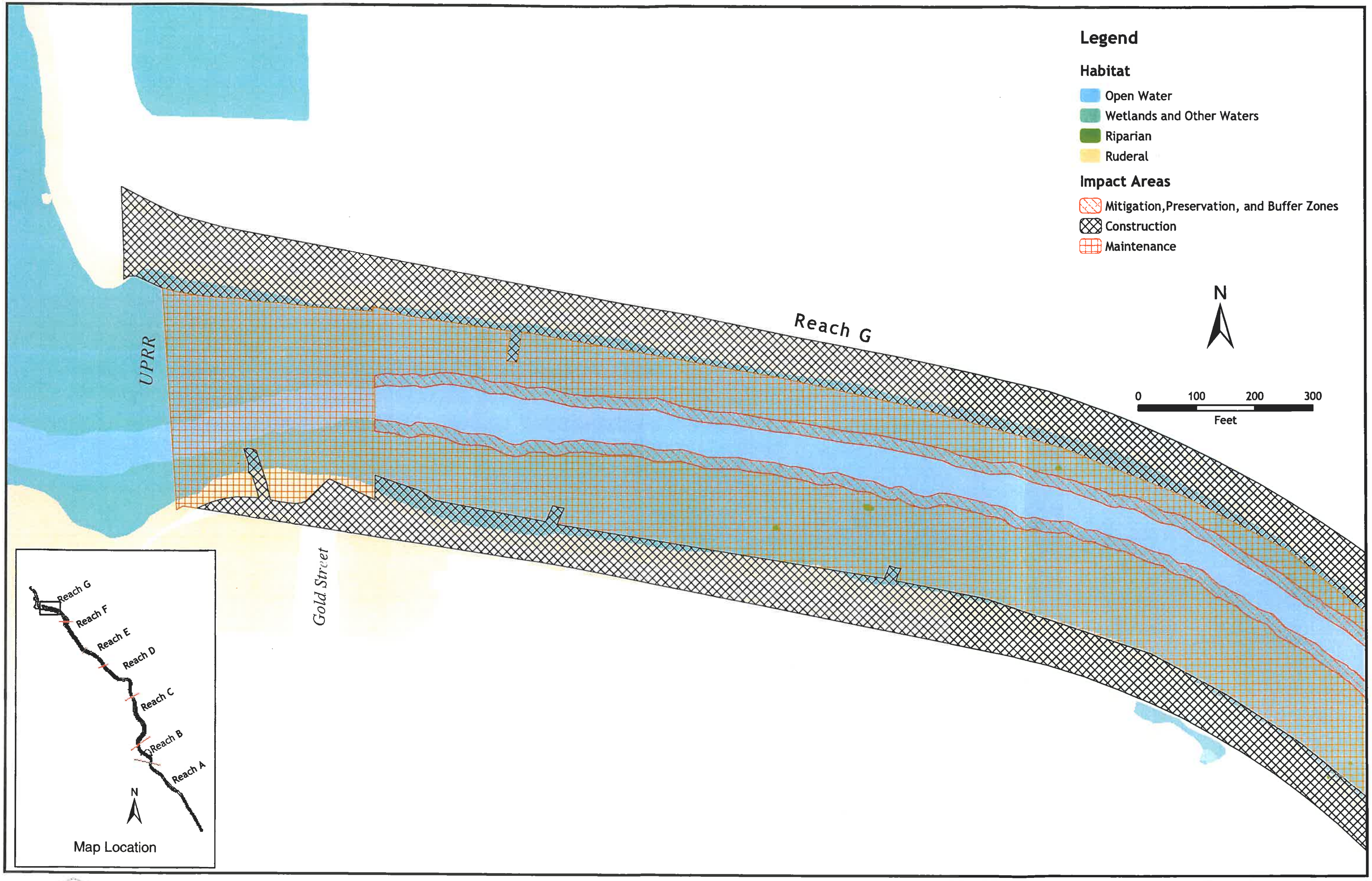

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Figure G-1. Alternative 2: Floodwalls/Levee Raise (Proposed Project)
Portion of Reach G
Sheet 16 of 16

Appendix H

U.S. Army Corps of Engineers Letter Regarding Local Cooperation Agreement (May 15, 2002)

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO
CORPS OF ENGINEERS
1325 J STREET
SACRAMENTO, CALIFORNIA 95814-2922

REPLY TO
ATTENTION OF
Programs and Project Management
Division

MAY 15 2002

Mr. Stan Williams, General Manager
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, California 95118-3686

Dear Mr. Williams:

This letter is in response to a request from Santa Clara Valley Water District (District) to clarify that the District is in compliance with the Local Cooperation Agreement (LCA) dated March 30, 1992 between The Department of The Army and the District for Construction of the Guadalupe River, California Project.

Paragraph k. (1) of Article II of the referenced LCA states in part: "The District shall insure that: The District channel improvements from Interstate Highway 880 downstream to San Francisco Bay...are operated and managed in such a way to convey design flood flows; and...".

The phrase "San Francisco Bay" should be construed as meaning the Union Pacific Railroad (UPRR) Bridge in Alviso (formerly the SPTC Bridge) because this bridge is the downstream point of reference for the Lower Guadalupe River Project (LGRP) in the Guadalupe River General Design Memorandum, dated January 1991, the Guadalupe River Letter Report dated May, 1991, and in the Guadalupe River Section 104 Evaluation Report dated September 1991, revised February 1992 (and the resulting approval of the Section 104 reimbursement). These documents were the basis for the LCA signed May 30, 1992. Also, the District description of the LGRP in numerous documents and reports, as well as on its website, is defined as Highway 880 to the UPRR Bridge in Alviso.

It is correct that subsequent studies and reports such as the "Biological Data Report for Proposed Modification to the Guadalupe River Project Downtown San Jose, California", dated March 3, 2000 have identified the need to address impacts downstream of the Alviso UPRR Bridge. However, this identification of a need does not place the District out of compliance with the March 30, 1992 LCA. The District designs and specifications currently being reviewed by the Corps show to date that the District should be able to meet its contractual requirement as identified in the LCA.

Should you have any questions concerning this issue, please contact Mr. Brandon Muncy, Project Manager at (916) 557-6682.

Sincerely,

Mark C. Charlton
Deputy for Project Management

Appendix I

CH2M Hill Letter Regarding Existing Levees within the LGRP (April 25, 2002)

MEMORANDUM **CH2MHILL**

Lower Guadalupe River Planning Study

Final Environmental Impact Report/Engineer's Report

TO: Dennis Cheong, Senior Project Manager
Santa Clara Valley Water District

FROM: David M. Von Rueden, P.E.
Senior Project Manager

DATE: April 25, 2002

This memo is in response to comments received on the Lower Guadalupe River (LGR) Draft EIR regarding stability of existing levees within the Lower Guadalupe River project area and their role in flood protection for north San Jose. The District owns, operates, and maintains the existing levees on the Guadalupe River from UPRR to I-880, as well as the eastern levee along Alviso Slough, from UPRR downstream to the Alviso County Marina. These levees have been the subject of extensive stability analyses under a variety of project alternatives, as defined in the LGR Engineer's Report. Several portions of these levees do not currently meet FEMA stability standards and will be upgraded to meet those standards as part of the recommended project.

All of the remaining levees within the project area are owned and maintained by other public and private entities. Based on visual observations, discussions with Cargill, who has historically maintained many of these levees for over 50 years, limited topographic data, and anecdotal information from various District staff, the salt pond levees and the Guadalupe Slough and Alviso Slough levees are generally non-engineered structures, constructed of locally-dredged materials.

Our Baylands Reconnaissance Study, completed in 2000, indicated that the crest elevation and the stability of the easterly Alviso Slough levee, downstream from the County Marina, represented a flood threat to the community of Alviso. Under existing conditions, a flood flow of approximately 14,000 cfs would reach Alviso Slough. During this type of flood event, some water spills over a low spot in the west levee into Pond A8. However, approximately 10,000 to 11,000 cfs would continue down Alviso Slough to Coyote Creek. This flowrate fills much of Alviso Slough, impacts biological habitat in the Slough and threatens the stability of the Slough levees. Our study showed that an overtopping of the easterly slough levee would likely breach that levee and cause flooding in Alviso. Under existing Slough conditions, the design event of 17,000 cfs would overtop the easterly Slough levee.

Based on this data, we proposed that a weir be constructed at the existing westerly levee low spot to protect it from the potential of breaching and to more safely and efficiently divert flood flows away from Alviso Slough and into the salt ponds between Alviso Slough and Guadalupe Slough, the historical floodway for Guadalupe River flows to San Francisco Bay. This Alviso Weir is designed to maintain Alviso Slough flood flow volumes, duration, and velocities to approximately those that exist today under current conditions. In other words, our recommended project, with the Alviso Weir in place, will not alter existing hydraulic, geotechnical, or biological conditions in Alviso Slough, compared to present conditions.

As disclosed in the LGR Draft EIR, the higher project floodflow and operation of the Alviso Weir will result in greater depth and volumes of water being diverted to and stored in Ponds A8, A5, A7, and A6. Due to the fact that the existing levees surrounding these ponds are non-engineered, as stated previously, there is some risk that these levees could fail under both existing and proposed conditions.

To minimize this threat, the recommended project includes pumping out the excess floodwater from all four ponds, soon after the storm event has passed. As shown in the Draft EIR, this pumping will actually draw down water levels in the pond (a few months) faster than the ponds would be evaporated to pre-storm levels (a couple of years) under present conditions.

This proposed pumping, plus the strengthening (i.e., weir construction) of the existing westerly Alviso Slough levee, represents an improvement over existing conditions in Ponds A8, A5, and A7. As described previously, the Alviso Weir will divert larger flood flows away from Alviso Slough, thus reducing the potential for overtopping/failure of the easterly Slough levee. The combination of these recommended project mitigation measures will provide a significant flood protection benefit to Alviso, compared to existing conditions.

It should also be noted that the other Guadalupe River-induced flood threats to Alviso, namely flooding through the County Marina and overland flooding from upstream levee/channel bank overtopping, are addressed by the LGR project. These threats are reduced by the District/County-sponsored improvements at the Marina and easterly Alviso Slough levee, and proposed levee/channel improvements upstream of the UPRR Bridge.

In conclusion, the recommended project, as a whole, will re-establish the original 17,000 cfs design capacity of the lower Guadalupe River, accommodate local drainage, and provide a flood protection betterment to Alviso and the entire lower Guadalupe River Watershed.

Appendix J

Technical Memorandum, Evaluation of Effects of Interior Drainage Flows on LGR Hydraulic Conditions

Technical Memorandum—Final

Northwest Hydraulic Consultants
3950 Industrial Boulevard, Suite 100c
West Sacramento, CA 95691
(916) 371-7400
(916) 371-7475 (fax)

Date: **June 3, 2002** **NHC Project: 50198 LGR**

To: David Von Rueden, PE

Company/Agency: CH2M HILL, San Jose

From: Robert MacArthur, PE

Subject: Evaluation of Effects of Interior Drainage Flows on LGR Hydraulic Conditions—Tech Memo

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Evaluation of Effects of Interior Drainage Flows on LGR Hydraulic Conditions—Technical Memo

Study Purpose

This memorandum summarizes the results of a hydrologic assessment of interior drainage contributions to the Lower Guadalupe River (LGR) downstream of I-880 and the hydraulic effects of interior stormwater drainage discharges into the LGR during the design flood event. The 6.7-mile project reach of the Guadalupe River lies between Interstate I-880 and the Union Pacific Railroad (UPRR) Bridge at Alviso. The study investigated changes in water surface elevation along the project reach when flows from local stormwater drainage facilities downstream of I-880 are combined with river flows expected to occur during a design (100-year) flood event, as defined by the United States Army Corps of Engineers (USACE). Floodplain mapping and interior flooding analyses were not part of this investigation.

Figure 1 shows the approximate extent of the study area and City of San Jose watershed boundaries for contributing interior areas draining into the Guadalupe River downstream of I-880. Figure 2 shows the study area and City of Santa Clara watershed boundaries for contributing interior areas draining into the Guadalupe River downstream of I-880. Figure 3 shows the approximate inlet locations of pumped flows entering the LGR from both sides of the river. Pump stations included explicitly in this study are highlighted in the figure. Station locations not highlighted were not explicitly included because they were estimated to contribute a small percentage (on the order of 10 percent or less) of the total likely discharge from all contributing pumping facilities downstream of I-880. Figure 4 shows the approximate locations of the six large gravity outfalls assumed to contribute the most gravity drainage occurring during a design event. These most significant outfalls are all greater than 36 inches in diameter and are located at elevations that allow them to discharge into the river during the design event. Those outfalls that are not included in these analyses either become submerged with flapgates closed during the design event so they can not discharge into the river, or they were so small (less than 36-inch diameter) as to contribute an insignificant amount to the total likely discharge from all contributing gravity outfalls downstream of I-880. All of the City of Santa Clara direct pumping and gravity outfalls to Guadalupe river, downstream of Interstate 880, were included in these analyses. Only one 30-inch diameter storm drain that discharges into a City of San Jose storm system near the airport, before discharging into the river, was not analyzed or included. The estimated sum of the pumps and gravity drains omitted from the San Jose side of the river (including the proposed future pump station modification (50 cfs) at the San Jose International Airport) is approximately 414 cfs.

A hydraulic sensitivity assessment was conducted to determine the effects of adding all of these minor flows (444 cfs total) to the river at each inlet location, assuming that the pumps were discharging at maximum capacity. This is a conservative assumption, because the pumping peaks will most likely not coincide with the river peak discharge, as explained further on in this report. The sensitivity analysis indicated that the computed river water surface elevation at the peak of the design event increases by one inch or less throughout most of the study area, with a maximum increase in elevation of approximately 2.75 inches between river stations 9+810 to

10+170. Therefore, the net effect of adding the minor drains and pumps that were omitted does not have a significant impact on the computed water surface profile.

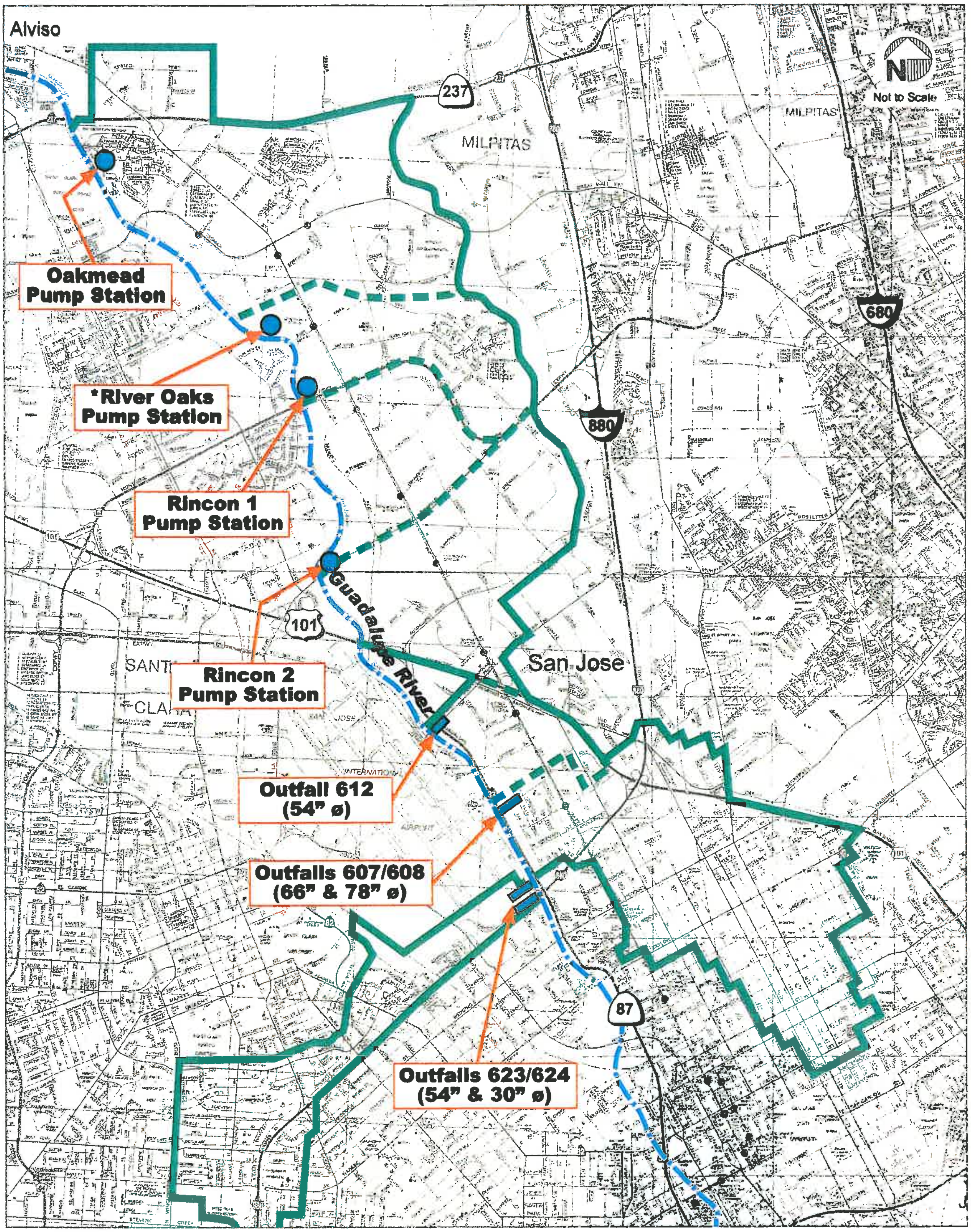
Table 1 summarizes the river station locations and discharges from the fourteen pumps and gravity outfalls considered in the study. Contributions from interior drainage facilities upstream of I-880 to Los Gatos Creek were not considered in this investigation. However, it is unlikely that significant local runoff enters the Guadalupe River downstream of St. John's Street gauge, before I-880. There are no pump stations in this reach and the gravity drains are likely to be affected (with possible flap gate closures) by high water conditions during bank-full flow in the river. The area downstream of the UPRR Bridge at Alviso is referred to as the Baylands and is outside the LGR Project reach. The LGR flows to the Bay through the Baylands. Therefore, an analysis was also conducted to evaluate potential effects of these cumulative river and interior drainage flows on water surface elevations along Alviso Slough and to ponding depths in the salt ponds adjacent to the slough.

Scope of Work

The scope of work for this study includes the following tasks:

- Review details regarding the storm sewer systems for the Cities of San Jose and Santa Clara, including their stormwater pumping and gravity outfall facilities. Select the most significant stormwater and gravity outfall facilities likely to contribute stormwater to the LGR during a design event downstream of I-880.
- Develop pump discharge and gravity outfall hydrographs for USACE 100-year, 72-hour rainfall event for each of the fourteen selected inlet locations shown in Figure 3 and Figure 4
- Review existing HEC-RAS model of LGR including cross-section geometries, bridge elevations, water surface profiles, and flow data
- Add pump discharge and gravity outfall flows to the HEC-RAS model at points of inflow into the Guadalupe River
- Test model stability and evaluate general model performance
- Develop and compare water surface profiles and velocities associated with the following flood scenarios:
    1. The 100-year USACE flood hydrograph alone, with no interior drainage facility (facility) discharges
    2. The cumulative effect of the 100-year USACE flood hydrograph and facility discharge hydrographs added together (referred to as the *Cumulative Effects of River Flows and Interior Drainage* modeling scenario)
    3. The effect of lagging the total facility discharge hydrograph such that its peak aligns (coincides) with the peak of the 100-year USACE flood hydrograph (referred to as the *Coincident Peak* modeling scenario)
- Investigate the sensitivity of computed water surface profiles to local floating debris jams at bridges

- Evaluate changes in water surface profiles and depths of ponding in the Baylands resulting from the *cumulative effects* scenario (second scenario above)
- Prepare a technical memorandum summarizing the approach and results from this investigation.
- Meet with District to discuss findings
- The study of gravity outfalls upstream of I-880 was not in the scope for this study.
- Floodplain mapping and interior flooding analyses were not part of this investigation.



W042002001SJC 153735.12.01 Tributaries.fh9 6/2/02(DVR)

Figure 1

City of San Jose Local Drainage Boundaries

Lower Guadalupe River Project

*River Oaks Pump Station not included in this study.

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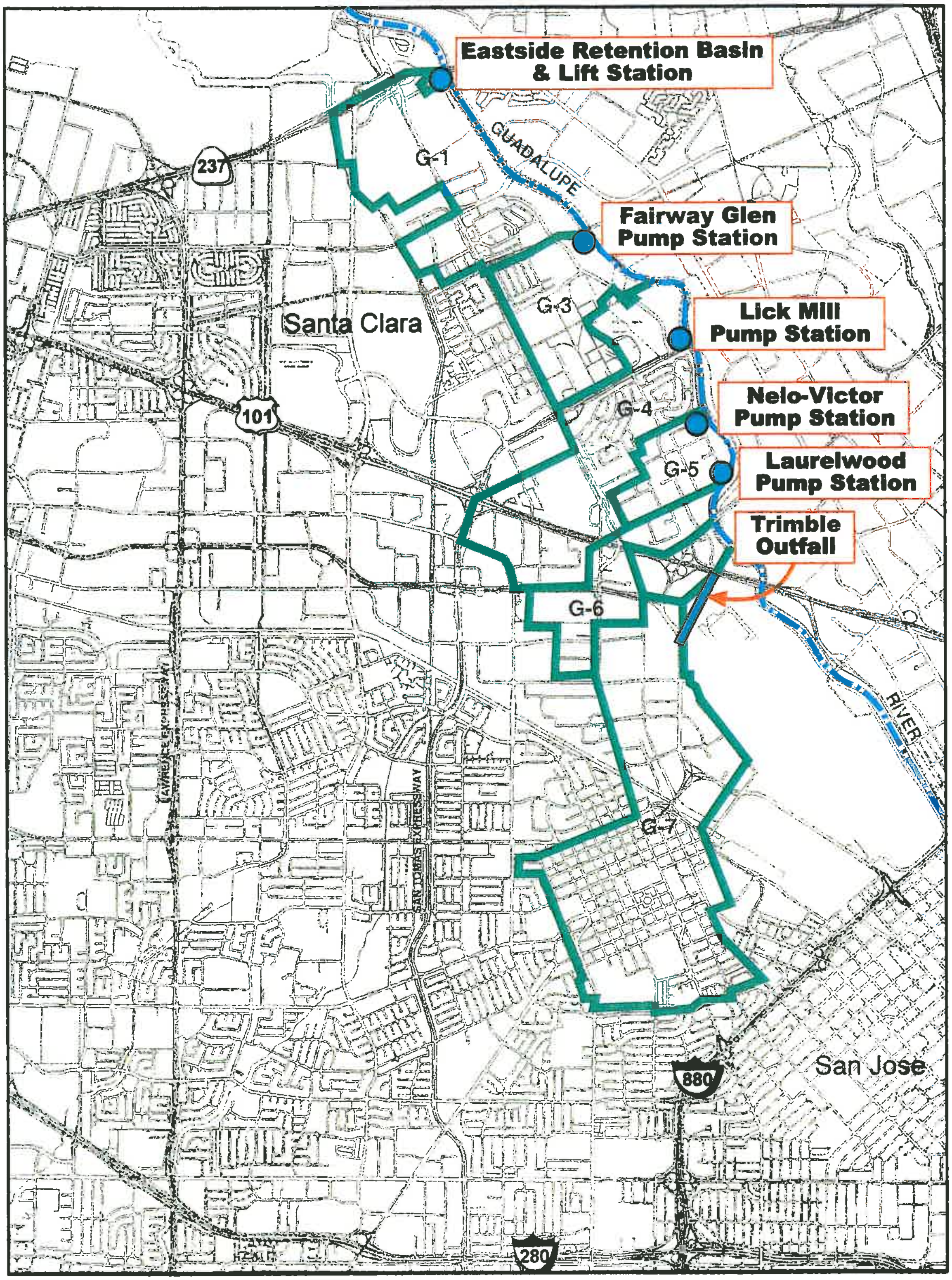

Not to Scale

W042002001SJC 153735.12.01 SantaClaraTributaries.FH9 6/2/02(DVR)

Figure 2
City of Santa Clara Local Drainage Boundaries
Lower Guadalupe River Project

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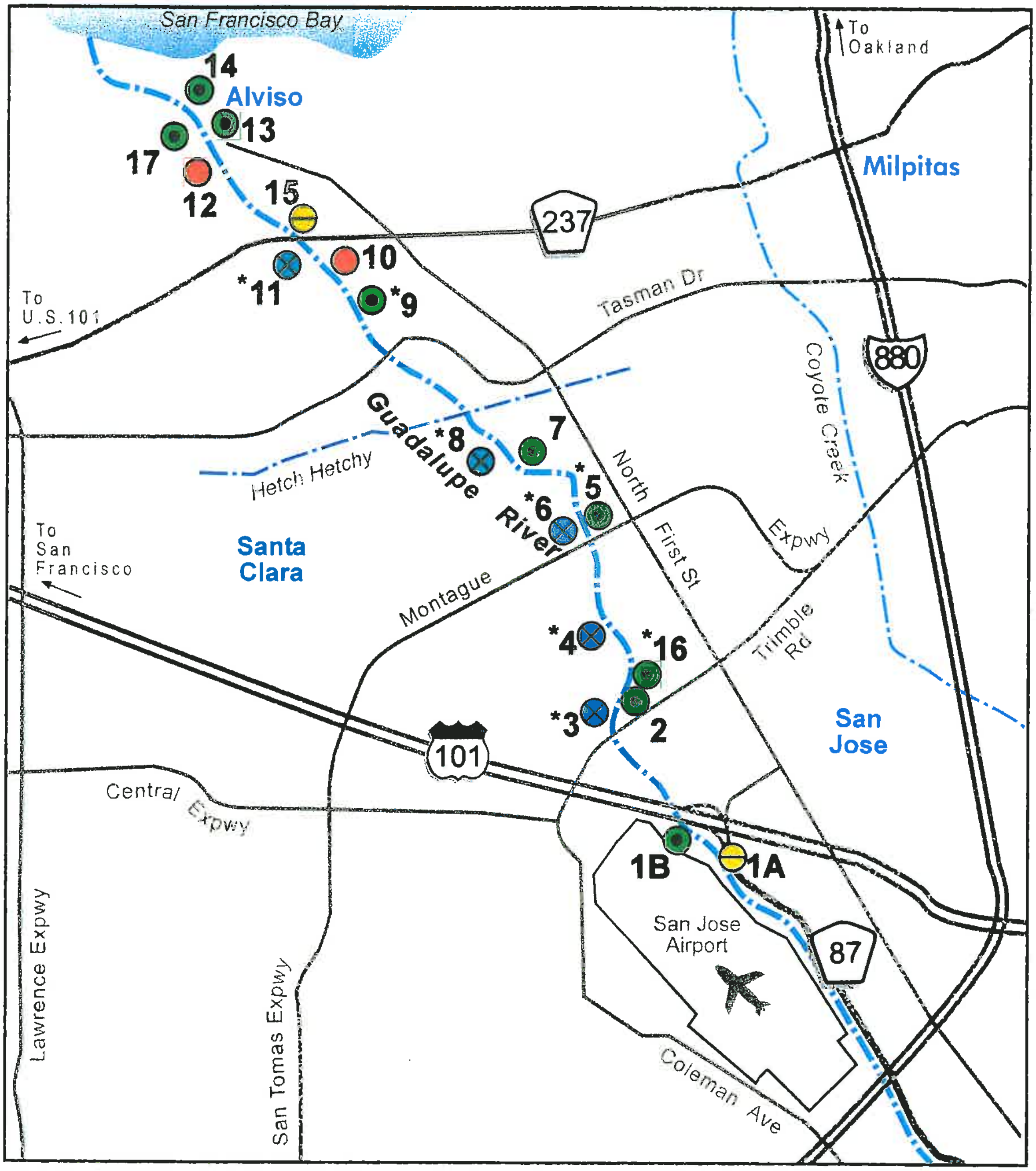

Pump Stations

1A	Airport Parkway Station (10.5 cfs)
1B	Airport (50 cfs)
2	Gateway (7 cfs)
* 3	Laurelwood & Victor (130 cfs)
* 4	Nelo & Victor (110 cfs)
* 5	Rincon 1 (360 cfs)
* 6	Lick Mill (230 cfs)
7	River Oaks (67 cfs)
* 8	Fairway Glen (170 cfs)
* 9	Oakmead (670 cfs)
10	Oakcrest Estates (12 cfs)
*11	East Side (100 cfs)
12	Summerset (21 cfs)
13	Alviso Pump Station 12 (0.2 cfs)
14	Elizabeth & Gold St. (45 cfs)
15	N. First Street (72 cfs)
* 16	Rincon 2 (600 cfs) (Proposed)
17	Alviso Pump Station 13

Ownership

- ● City of San Jose
- ⊗ City of Santa Clara
- ⊖ Caltrans
- ● Private

N

0 5280
1000 4000
Scale In Feet

* = Pump Stations included in this report.

Figure 3
Approximate Locations of Pump Stations
Lower Guadalupe River Project

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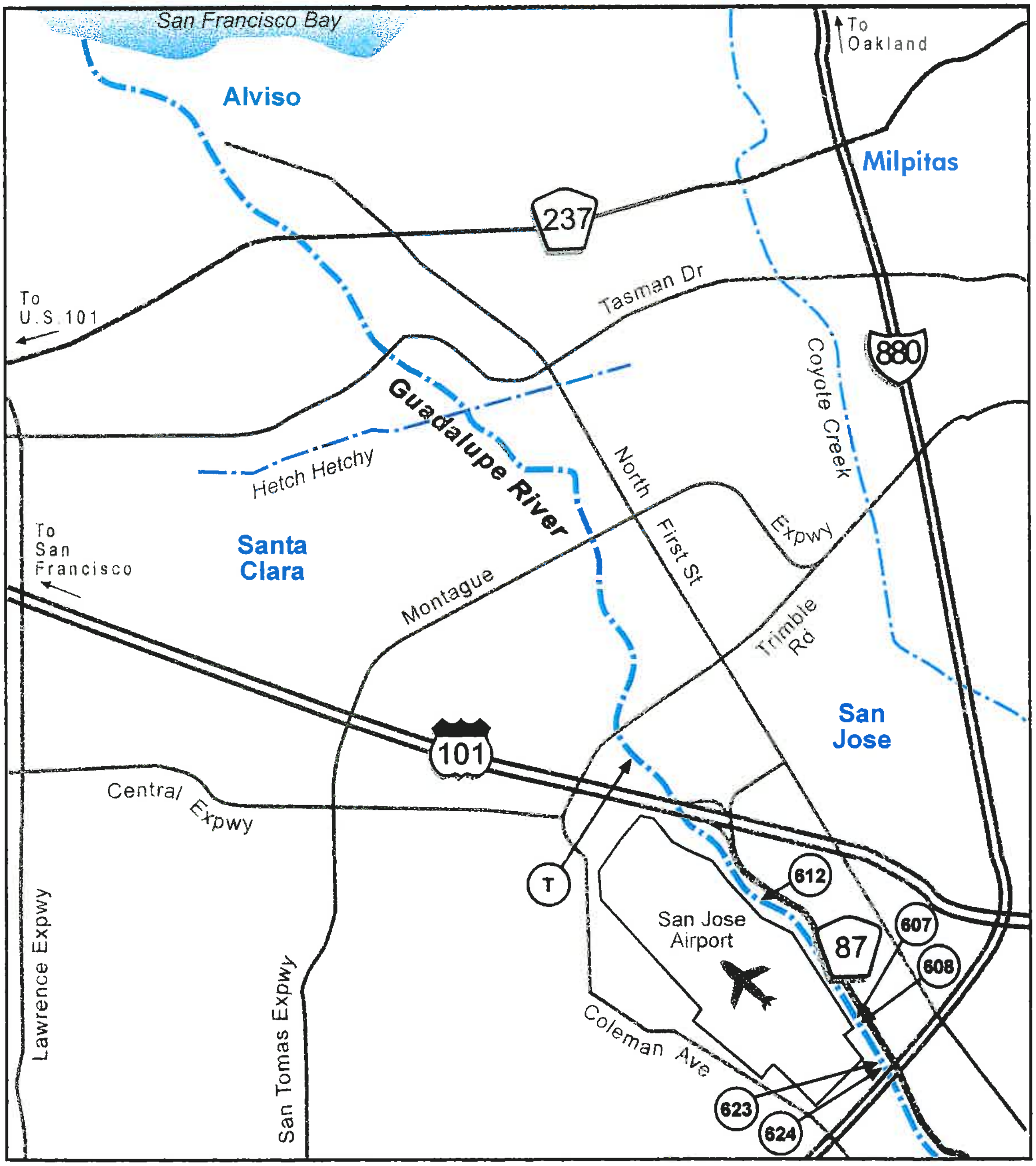


Legend

City of San Jose

(612) 54-Inch Storm Drain

(607) (608) 66-Inch/78-Inch Storm Drain

(623) (624) 54-Inch/30-Inch

City of Santa Clara

(T) Trimble Outfall

N

0 5280
1000 4000
Scale In Feet

Figure 4
Approximate Locations of Large Gravity Outfalls
Lower Guadalupe River Project

CH2MHILL

W042002001SJC 153735.12.01 PumpStations-2.FH9 6/2/02(DVR)

Structure of Memo

A summary of the overall study findings and brief descriptions of the data, assumptions and methods used to develop these results are summarized below. Appendices A and B provide detailed summaries of the findings, data, assumptions, and methods used to estimate interior drainage volumes, pumped flows, and gravity outfall contributions to the LGR during the occurrence of a 100-year, 72 hour regional storm event as defined by the USACE.

Summary of Findings

Interior Drainage Facility Discharges. Table 1 presents the pump and gravity outfall discharges for the fourteen pump and gravity outfalls added to the "with-project" HEC-RAS model. The column entitled "Discharge during 17k Flood Hydrograph Peak" lists the discharges from each pump or gravity drain facility at the moment the peak of the design flood hydrograph passes through the reach. These discharges were added to the USACE's 17,000-cubic-feet-per-second (cfs) flood at their respective cross section stations to develop the Cumulative Effects of River Flows and Interior Drainage modeling scenario. The "Discharge at Facility at Cumulative Peak" column in Table 1 lists the individual pump or gravity drain facility discharges occurring at the time when the cumulative hydrograph for all fourteen facilities reaches its peak. These were added to the 17,000-cfs flood flow to develop the Coincident Peak modeling scenario. This coincident peak scenario considers the possibility that the interior drainage flows may be lagged by about eight hours because of a storm cell delay or a second cell's appearance over the drainage area. It can be viewed as a worst-case scenario, for comparison purposes, in which the peak of the flood hydrograph coincides with the peak of the cumulative facility discharge hydrograph.

Development of Model Flows and Hydrographs. The total contribution from the interior drainage facilities occurring at the time of the peak of the design flood hydrograph was calculated to be 1,325 cfs. The peak of the cumulative facility discharge hydrograph was calculated to be 3,027 cfs. Adding these discharges to the 17,000-cfs peak of the flood hydrograph results in estimated total discharges of 18,325 cfs (cumulative peak near UPRR at Alviso) and 20,027 cfs (coincident peak near UPRR at Alviso) for the two modeling scenarios, respectively. See Figure 5 and Figure 6 for these results.

The instantaneous pumping discharges presented in Table 1 were added to the steady-state HEC-RAS model as inflows at cross sections nearest to the facility's actual location. A cumulative hydrograph from the fourteen discharge facilities was developed and plotted together with the 100-year, Guadalupe River flood hydrograph in Figure 5. These two hydrographs were then added together to produce the *Cumulative Effects* of River Flows and Interior Drainage Hydrograph also presented in Figure 5. The peak discharge resulting from this scenario is 18,325 cfs near UPRR Bridge at Alviso.

The peak discharges from the cumulative facility discharge and USACE 100-year flood hydrographs occur at hours 36.75 and 45, respectively (Figure 5). Thus, the maximum facility discharge into the river develops about eight hours before the peak of the river hydrograph. A worst-case scenario hydrograph was developed by lagging the cumulative facility discharge hydrograph by 8.25 hours so the two hydrograph peaks align at the same time. This coincident peak hydrograph is presented in Figure 6. The peak discharge resulting from this scenario is 20,027 cfs near the UPRR Bridge.

Table 1. Pump Station and Gravity Outflow Discharges Downstream of I-880

Facility	Cross Section Station (*P*-line)	Discharge during 17k Flood Hydrograph Peak, cfs(1)	Discharge at Each Facility at Cumulative Peak, cfs(2)	Maximum Discharge During Event, cfs	Data Source
100-year Flood Hydrograph	17+612	17,000	17,000	17,000	USACE
2 Gravity Outfalls 623 and 624	17+580	107	205	205	A-N West
2 Gravity Outfalls 607 and 608	16+710	172	510	510	A-N West
1 Gravity Outfall 612	15+670	33	110	110	A-N West
Trimble Outfall	14+010	166	280	280	Schaaf & Wheeler
Pump Station Rincon2	13+500	120	468	474	A-N West
Pump Station Laurelwood	13+260	132	132	132	Schaaf & Wheeler
Pump Station Nelo-Victor	12+510	56	112	112	Schaaf & Wheeler
Pump Station Rincon1	11+807	79	242	242	A-N West
Pump Station Lickmill	11+760	156	234	234	Schaaf & Wheeler
Pump Station Fairway Glen	10+110	83	166	166	Schaaf & Wheeler
Pump Station Oakmead	8+640	120	468	474	A-N West
Pump Station Eastside	8+056	101	101	101	Schaaf & Wheeler
Total Discharge Entering Alviso Slough DS of UPRR	7+090	18,325	20,027	20,039	NHC

(1) Values used to develop the *Cumulative Peak Scenario*

(2) *Values* used to develop the *Coincident Peak Scenario*

Modeled Water Surface Profiles and Velocities. The water surface profiles generated from the USACE's 100-year flood alone and 100-year flood combined with the cumulative and coincident facility discharges were plotted from station 6+000 to 12+000 in Figure 7 and stations 12+000 to 17+612 in Figure 8. Flood depths below station 6+000 were essentially the same for all three scenarios because of west levee overtopping and spill into pond A8 at that location. The numerical modeling results are summarized in Table 2 and Table 3 for the cumulative and coincident peak flood plus pumping scenarios.

Table 2. Results from the Cumulative Effects of River Flows and Interior Drainage Modeling Scenario

Bridge	Approximate Station *P*-Line	Water Surface Elevations				Velocity fps	Lowest Elevation of Bridge		
		17k only, m	w/ Facility Discharges, m	Difference			Elev m	Submergence	
				m	ft			m	ft
I880	17+612	17.88	17.91	0.03	0.10	-	-	-	-
Skyport	16+282	14.65	14.70	0.05	0.16	7.22	16.10	-	-
Airport	15+683	13.07	13.11	0.04	0.13	11.29	12.97	0.14	0.46
Parking	14+694	11.42	11.48	0.06	0.20	10.37	12.95	-	-
US101	14+528	11.11	11.18	0.07	0.23	11.35	11.01	0.17	0.56
Trimble	13+700	9.76	9.84	0.08	0.26	8.23	9.84	-	-
Montague	11+825	8.24	8.42	0.18	0.59	6.63	7.60	0.82	2.69
Tasman	9+241	6.36	6.52	0.16	0.52	5.97	6.55	-	-
E237	8+043	5.59	5.72	0.13	0.43	7.41	6.41	-	-
W237	8+010	5.50	5.62	0.12	0.39	6.89	6.40	-	-
Gold St	7+116	4.90	5.01	0.11	0.36	6.56	5.08	-	-
UPRR	7+004	4.86	4.98	0.12	0.39	5.61	4.99	-	-

Table 3. Results of the Coincident Peaks Modeling Scenario

Bridge	Approximate Station *P*-Line	Water Surface Elevations				Velocity fps	Lowest Elevation of Bridge		
		17k only, m	w/ Facility Discharges, m	Difference			Elev m	Submergence	
				m	ft			m	ft
I880	17+612	17.88	17.93	0.05	0.16	-	-	-	-
Skyport	16+282	14.65	14.77	0.12	0.39	7.15	16.10	-	-
Airport	15+683	13.07	13.21	0.14	0.46	11.22	12.97	0.24	0.79
Parking	14+694	11.42	11.65	0.23	0.75	10.53	12.95	-	-
US101	14+528	11.11	11.36	0.25	0.82	11.22	11.01	0.35	1.15
Trimble	13+700	9.76	9.95	0.19	0.62	8.23	9.84	0.11	0.36
Montague	11+825	8.24	8.68	0.44	1.44	6.50	7.60	1.08	3.55
Tasman	9+241	6.36	6.75	0.39	1.28	5.87	6.55	0.20	0.66
E237	8+043	5.59	5.91	0.32	1.05	7.09	6.41	-	-
W237	8+010	5.50	5.81	0.31	1.02	6.56	6.40	-	-
Gold St	7+116	4.90	5.14	0.24	0.79	6.23	5.08	0.06	0.19
UPRR	7+004	4.86	5.10	0.24	0.79	5.35	4.99	0.11	0.36

Modeling results reveal that submergence of the lowest portion (elevation) of the bridge deck (soffit) occurs at three of the twelve bridges in the project area during the cumulative effects scenario and at seven of the twelve bridges during the coincident peaks scenario. Figure 9 through Figure 19 present the water surface elevations generated by the HEC-RAS model at each of the twelve bridges in the study area. Figure 14 clearly shows that the Montague Expressway Bridge is deeply submerged and pressurized, even without contributions from interior drainage facility discharge inflows and becomes more submerged (2.69 and 3.55 feet) with the addition of interior drainage flows. The bridges at Highway 101, Trimble Road, Gold Street, and the Union Pacific Railroad are all very close to pressurizing during the simulations. The lowest soffit elevation used for the Tasman Road Bridge is the low chord of the VTA-LRT bridge, located between the east and west bound vehicle bridges.

The computed water surface elevation at the downstream face of the Interstate 880 bridge is calculated to be 17.88 meters when applying only the 100-year USACE flood (no interior drainage). The water surface elevation at the bridge increases to 17.91 and 17.93 meters for the cumulative discharge and coincident peaks scenarios, respectively due to the addition of interior drainage flows entering Reach A, downstream of I-880. It should be noted that all three water surface elevations are slightly above the 17.86-meter project design criteria for the downstream face of the bridge.

The maximum channel velocities at the bridges for the two modeled scenarios range between 5.4 and 11.4 feet per second (fps) (see Table 2 and Table 3). Bridges with velocities exceeding 7 fps indicate areas where significant channel scour is likely to occur. In addition, such high velocities through bridges tend to dissipate huge amounts of energy if the jet is not directly aligned with the downstream channel. This may cause upstream water surface elevations to increase higher than would be predicted by the one-dimensional model.

Debris Jam Sensitivity Analysis. A sensitivity analysis was performed to determine potential effects of floating debris jams that could occur at the upstream face of bridges during a large flood event. Results from this analysis are intended to identify bridges that are most sensitive to floating debris loading and to demonstrate the importance of long-term river maintenance and the need for flood fighting capacity at LGR bridges. The analysis was accomplished by lowering the low chords of each bridge by two feet to simulate blockage from floating debris. The resulting water surface elevations increased by between 0.13 and 0.58 meters (0.4 and 1.9 feet) at the bridges. This simplified method of estimating the effects of debris jams resulted in most bridges becoming pressurized. The results of the debris sensitivity analysis are summarized in Table 4. The three bridges most affected by the effects of floating debris are Airport Parkway, Parking Lot, and US 101. The results indicate that during high levels of floating debris loading, the bridges in the study area are unlikely to be overtopped, but are likely to require emergency debris removal during significant flood events.

Table 4. Profile Differences Generated by Lowering Bridge Chords
Two Feet to Simulate Debris Jams

Bridge	Cumulative Discharge Profile				Coincident Peaks Profile			
	No Debris	Debris	Difference		No Debris	Debris	Difference	
	m	m	m	ft	m	m	m	ft
Skyport	14.65	14.78	0.13	0.43	14.65	14.88	0.23	0.75
Airport	13.07	13.47	0.40	1.31	13.07	13.65	0.58	1.90
Parking	11.42	12.01	0.59	1.94	11.42	12.24	0.82	2.69
US101	11.11	11.69	0.58	1.90	11.11	11.92	0.81	2.66
Trimble	9.76	10.01	0.25	0.82	9.76	10.21	0.45	1.48
Montague	8.24	8.53	0.29	0.95	8.24	8.81	0.57	1.87
Tasman	6.36	6.58	0.22	0.72	6.36	6.88	0.52	1.71
E237	5.59	5.79	0.20	0.66	5.59	6.16	0.57	1.87
W237	5.50	5.70	0.20	0.66	5.50	5.93	0.43	1.41
Gold St	4.90	5.14	0.24	0.79	4.90	5.31	0.41	1.35
UPRR	4.86	5.03	0.17	0.56	4.86	5.18	0.32	1.05

The Highway 101 Bridge is the most sensitive to debris jamming. A simulation in which the low chord of only the Highway 101 bridge was lowered two feet resulted in local water surface increases of about 1.6 feet upstream of the bridge.

Modeling Methodology and Assumptions

Hydraulic Model Description. The hydraulic model used in this study was HEC-RAS Version 3.0 developed by the Hydrologic Engineering Center (HEC) of the USACE. HEC-RAS 3.0 is a one-dimensional, open-channel flow model that can analyze both steady and unsteady flows. For reasons of consistency with previous Guadalupe River modeling efforts, this study was performed using only the steady-state capability of HEC-RAS.

One-dimensional models are capable of calculating only the average flow depth and velocity at river cross sections. They cannot evaluate flow retardation or energy loss due to turbulence or local eddy formation. Energy loss in HEC-RAS is approximated using the Manning equation and a Manning coefficient, or Manning's *n*, which is a lumped energy loss and turbulence parameter applied at each cross section. In HEC-RAS, multiple Manning coefficients can be defined along the length of a cross section to model lateral changes in roughness resulting from channel geometry, bed material characteristics and vegetation. Values for Manning's *n* used in this particular study ranged from 0.027 to 0.030 in the main channel and 0.030 to 0.080 in the flood plains.

Cross Sections and Bridge Data. The cross sections and bridge geometries used in this study were obtained from an earlier baseline conditions HEC-RAS model of the Guadalupe River developed by Northwest Hydraulic Consultants for the Lower Guadalupe River Flood Control Project. The baseline model was calibrated to observed high water elevations in the Guadalupe River that occurred during the 1995 flood event. A total of 367 sections are included in the 6.7-mile reach. The low chord data for the bridges in the model correlated well with the latest survey data obtained from CH2MHill (February 2001), typically within a 0.05- to 0.10-meter tolerance. An exception was the Skyport Bridge model data, which was approximately 0.7 meters lower than the latest survey. This did not affect any previous HEC-RAS studies since the low chord of the bridge in both data sets was well above all flood water surface elevations. The model data for Skyport Bridge in this study was adjusted to match the new survey data.

Boundary Conditions. The downstream boundary condition used for all simulations discussed in this report is based on the 10-year maximum tide elevation of 3.1 meters NAVD 88 with spill occurring over the west Alviso Slough levee into pond A8. The upstream boundary condition at I-880 is 17,000 cfs, which represents the peak of the 100-year USACE hydrograph. Lateral inflows representing drainage pump discharges and gravity outfalls are added to the model at the cross section locations listed in Table 1. The hydrographs for each of the 14 facilities were prepared by A-N West, Inc., and Schaaf and Wheeler. Detailed summaries of their data, assumptions, methods, and findings are reported in Appendices A and B.

Present-Day Conditions Were Assumed for all Interior Drainage Facilities. This study assumed present-day conditions for all of the Interior Drainage Facilities considered herein. Contributions from interior drainage facilities upstream of I-880 to Los Gatos Creek were not considered in this investigation and it is assumed that no additional facilities or improvements that contribute significant flow to the river will be added. One exception, however, is the Rincon 2 pump station which is included in these analyses even though it is not constructed yet, but is completely designed and slated for construction soon. Other future improvements not explicitly included in this study are upgrades planned for the City of Santa Clara's Laurelwood and San Jose International Air Port pump stations. The potential effects of these improvements were considered, however, through a sensitivity analysis. The hydraulic sensitivity assessment was conducted to determine the effects of adding all of the minor gravity flows and possible pump improvements (444 cfs total) we are aware of at this time that were not previously included. These flows were added to the river at each inlet location, assuming that the pumps were discharging at maximum capacity. This is a conservative assumption, because the pumping peaks will most likely not coincide with the river peak discharge, as explained further on in this report. Results from the sensitivity analysis indicated that the computed river water surface elevation at the peak of the design event increases by one inch or less throughout most of the study area, with a maximum increase in elevation of approximately 2.75 inches between river stations 9+810 to 10+170. Therefore, the net effect of adding the minor drains and pumps that were omitted does not have a significant impact on the computed water surface profile.

Figure 5. Cumulative Effects of River Flows and Interior Drainage Hydrograph Development

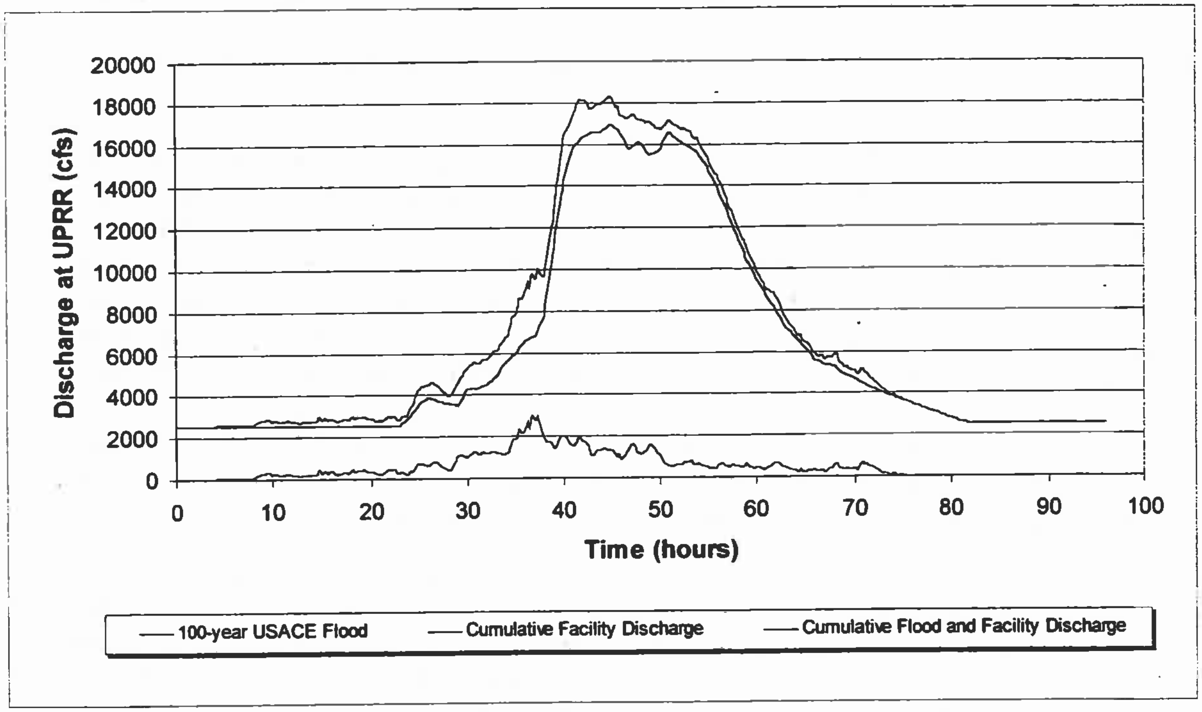


Figure 6. Coincident Peaks Hydrograph Development

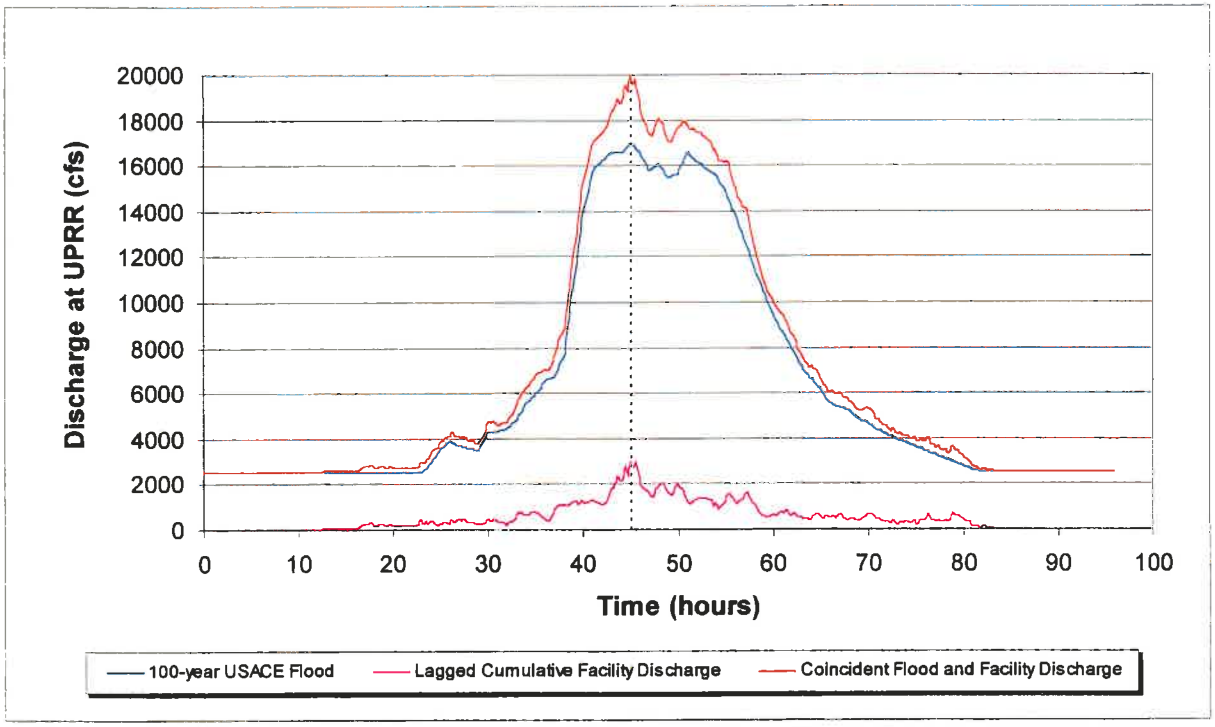


Figure 7. Guadalupe River Water Surface Profiles (Stations 6+000 to 12+000)

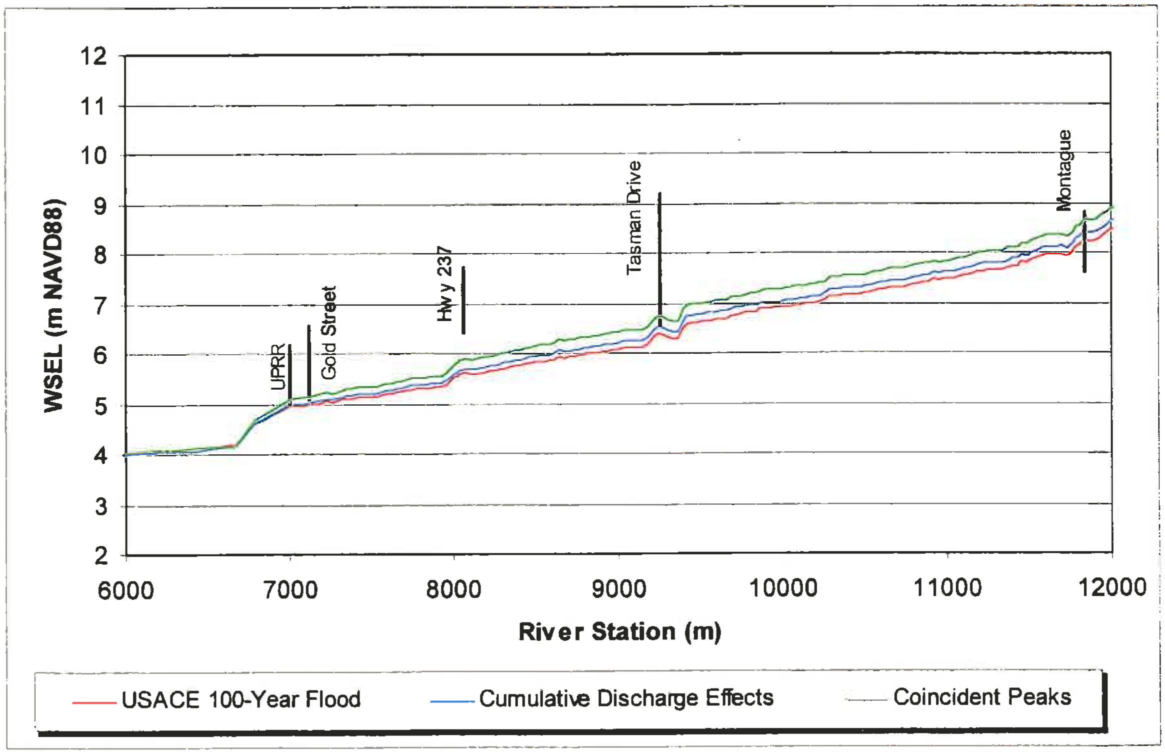


Figure 8. Guadalupe River Water Surface Profiles (Stations 12+000 to 17+612)

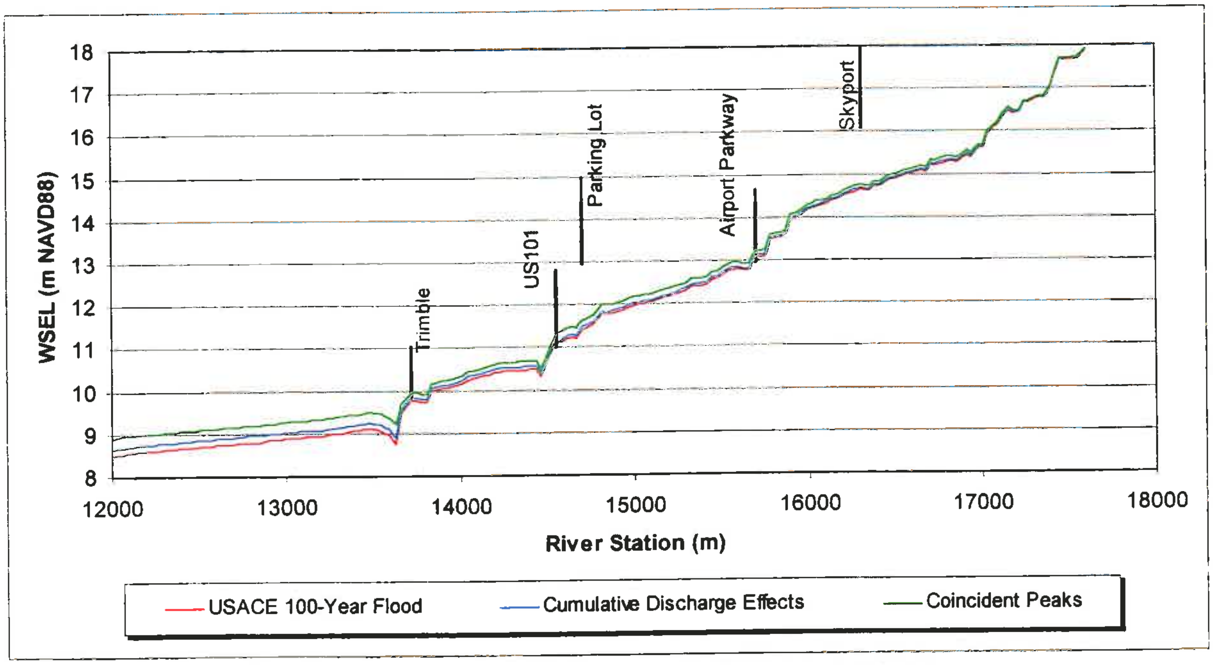


Figure 9. Water Surface Elevations at Skyport Drive Bridge

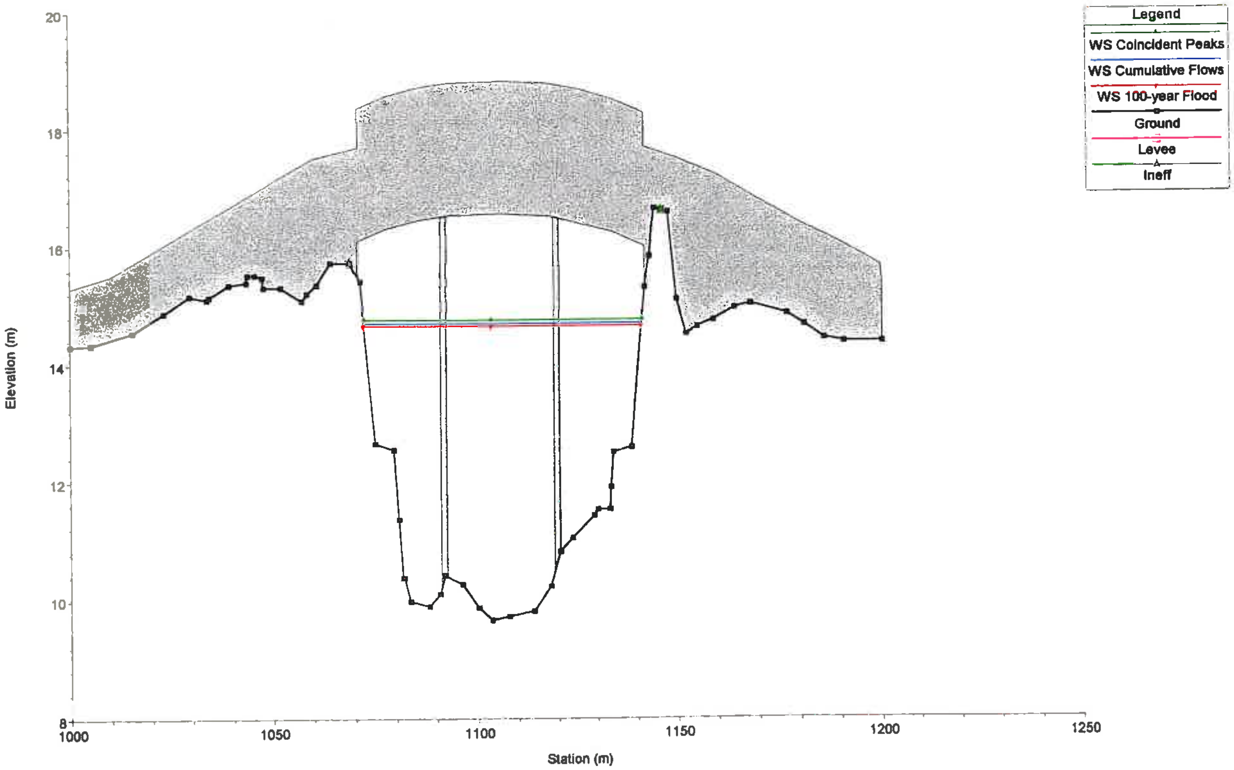


Figure 10. Water Surface Elevations at Airport Parkway Bridge

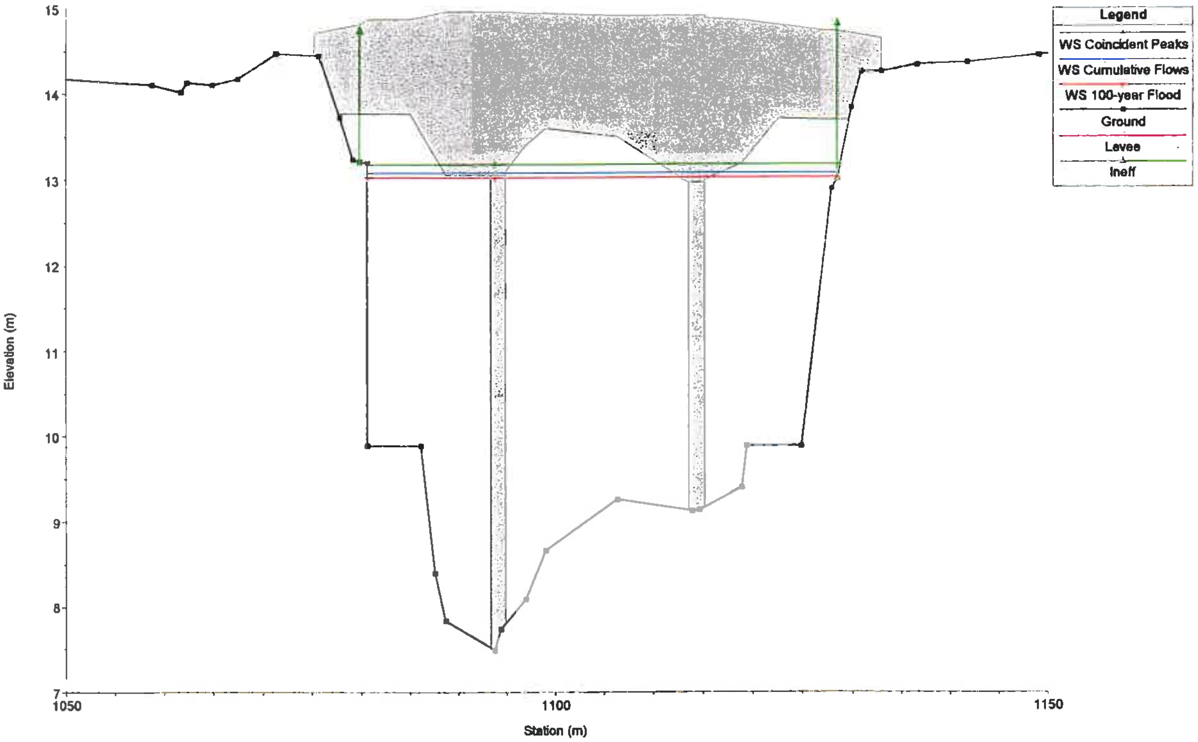


Figure 11. Water Surface Elevations at Parking Lot Bridge

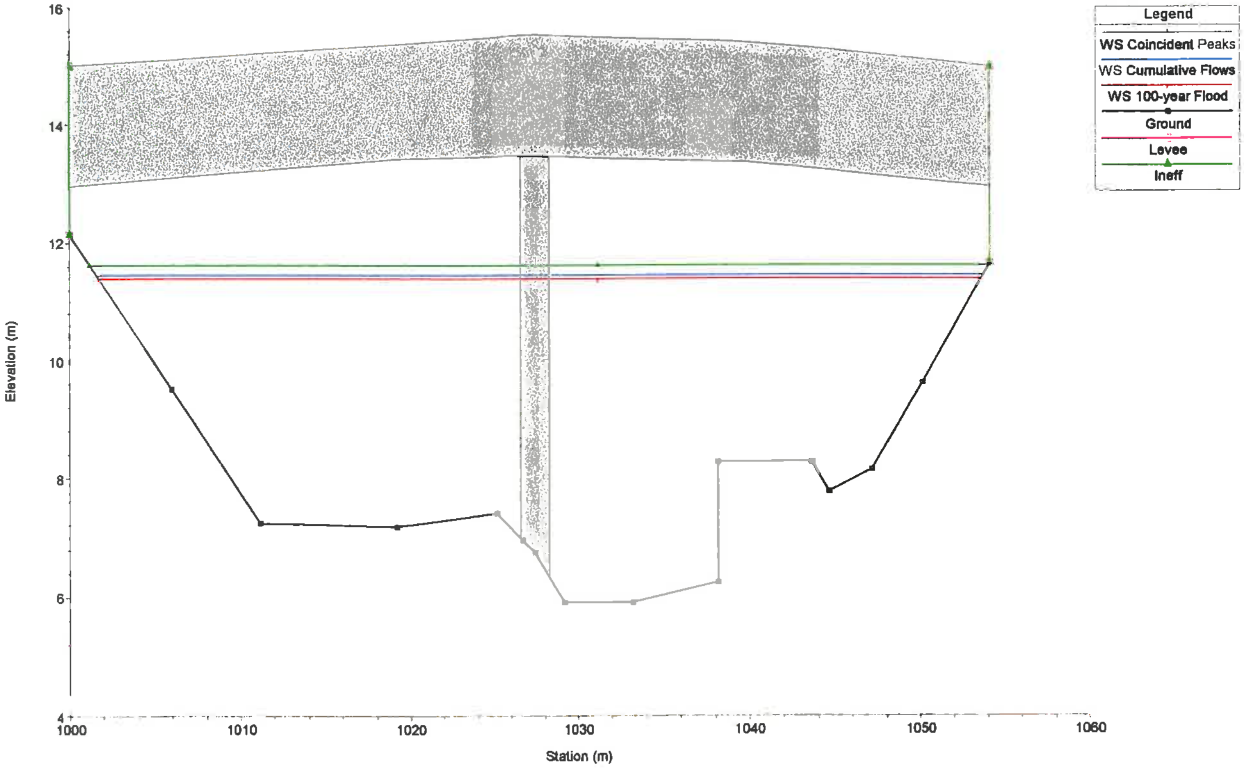


Figure 12. Water Surface Elevations at Highway 101 Bridge

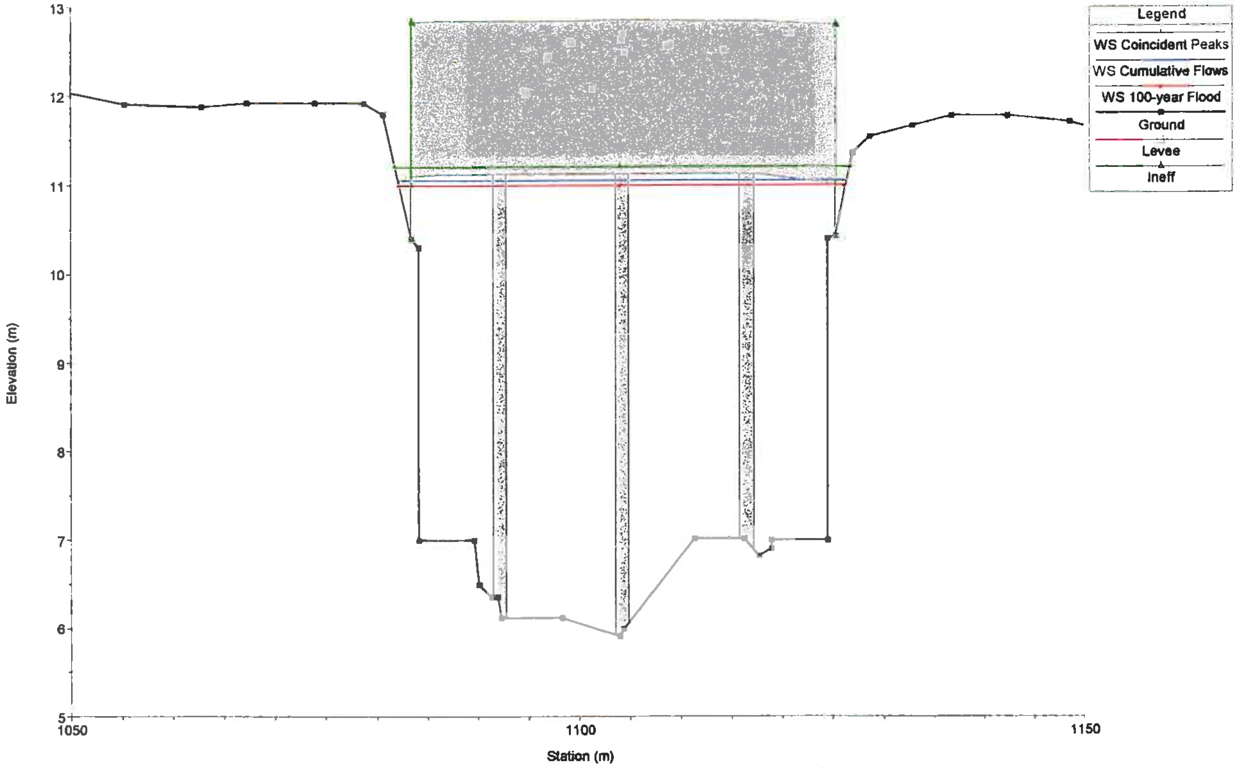


Figure 13. Water Surface Elevations at Trimble Road Bridge

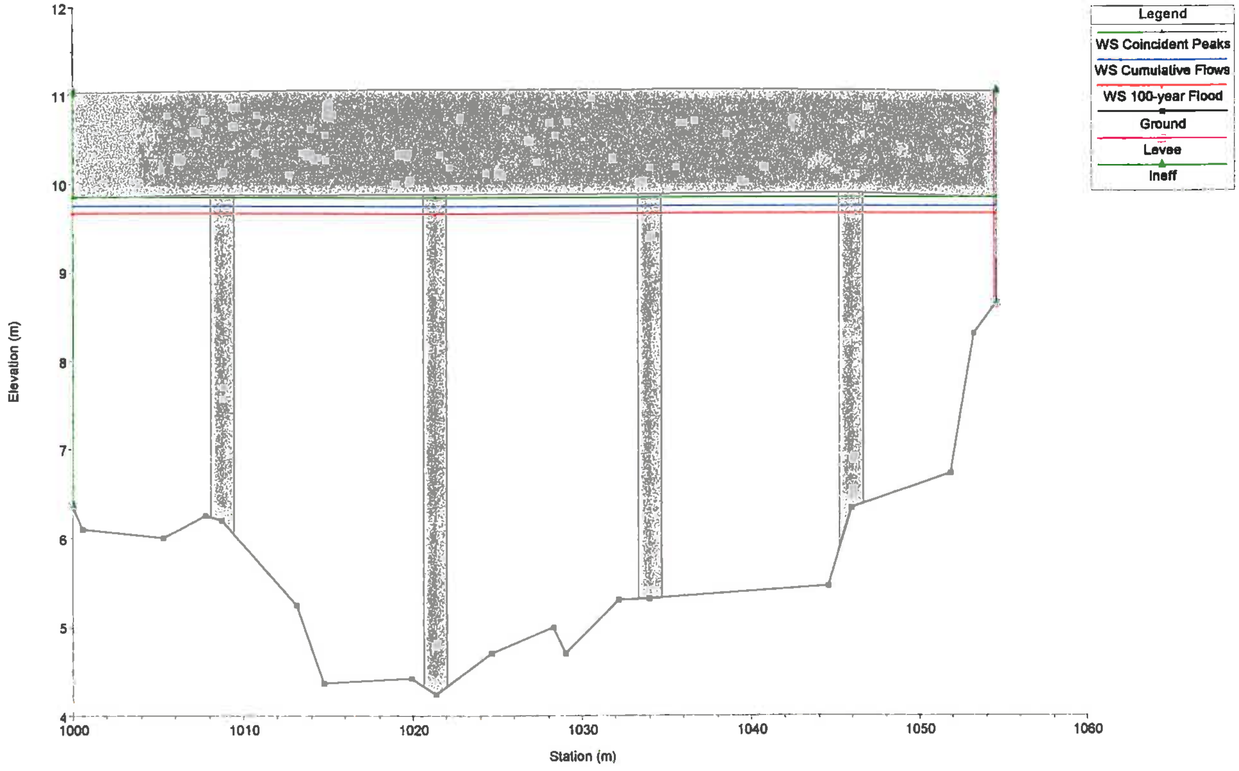


Figure 14. Water Surface Elevations at Montague Expressway Bridge

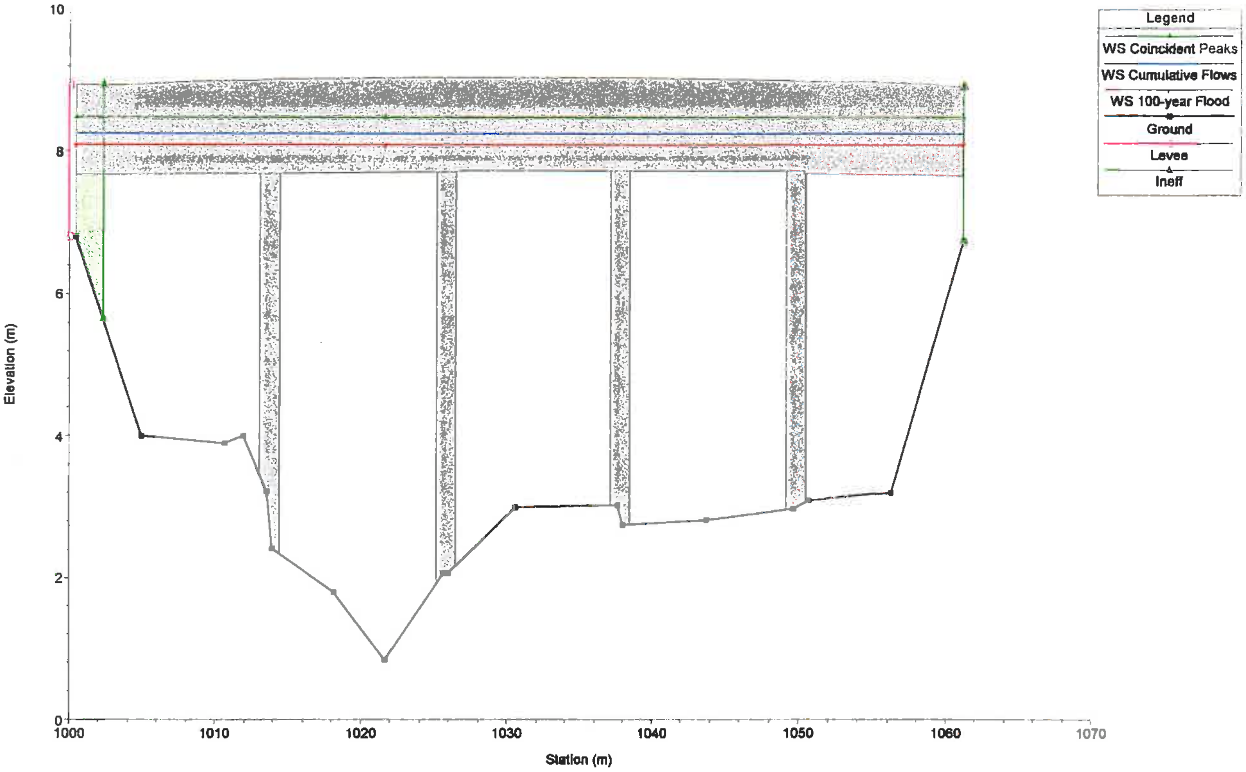


Figure 15. Water Surface Elevations at Tasman Drive Bridge

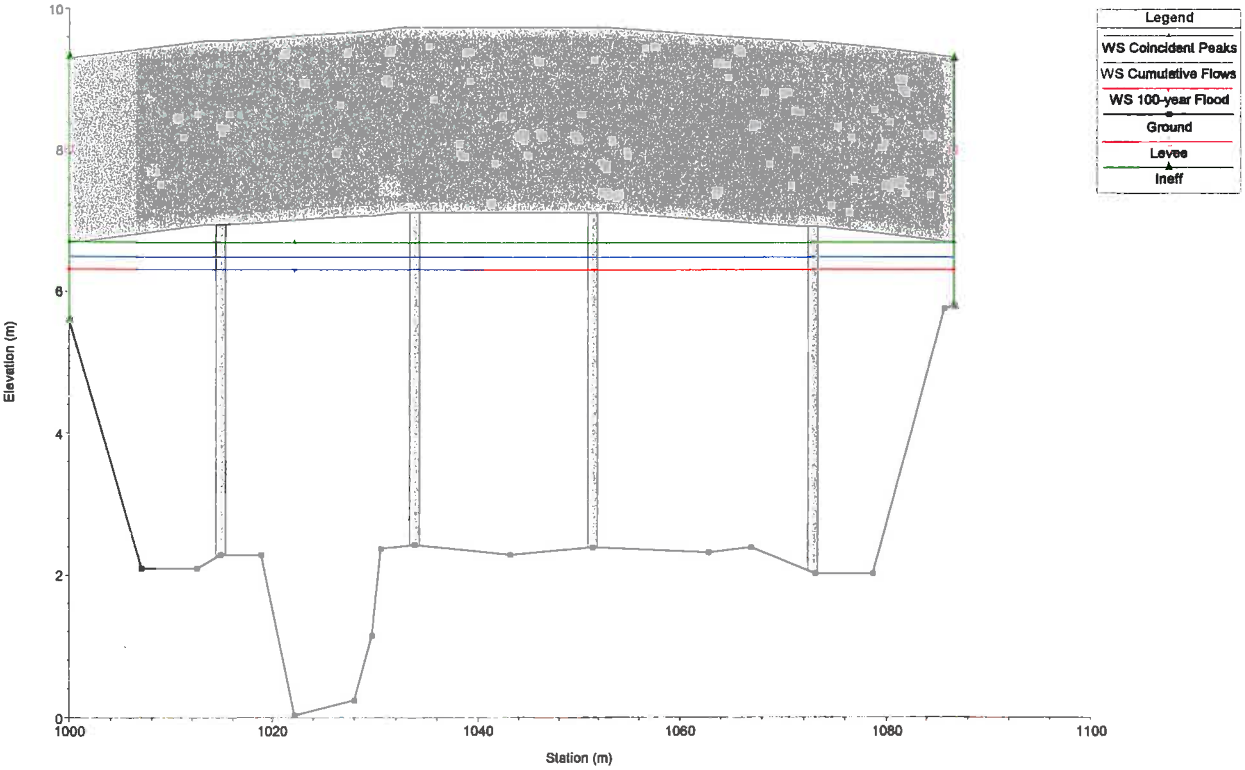


Figure 16. Water Surface Elevations at East Bound 237 Bridge

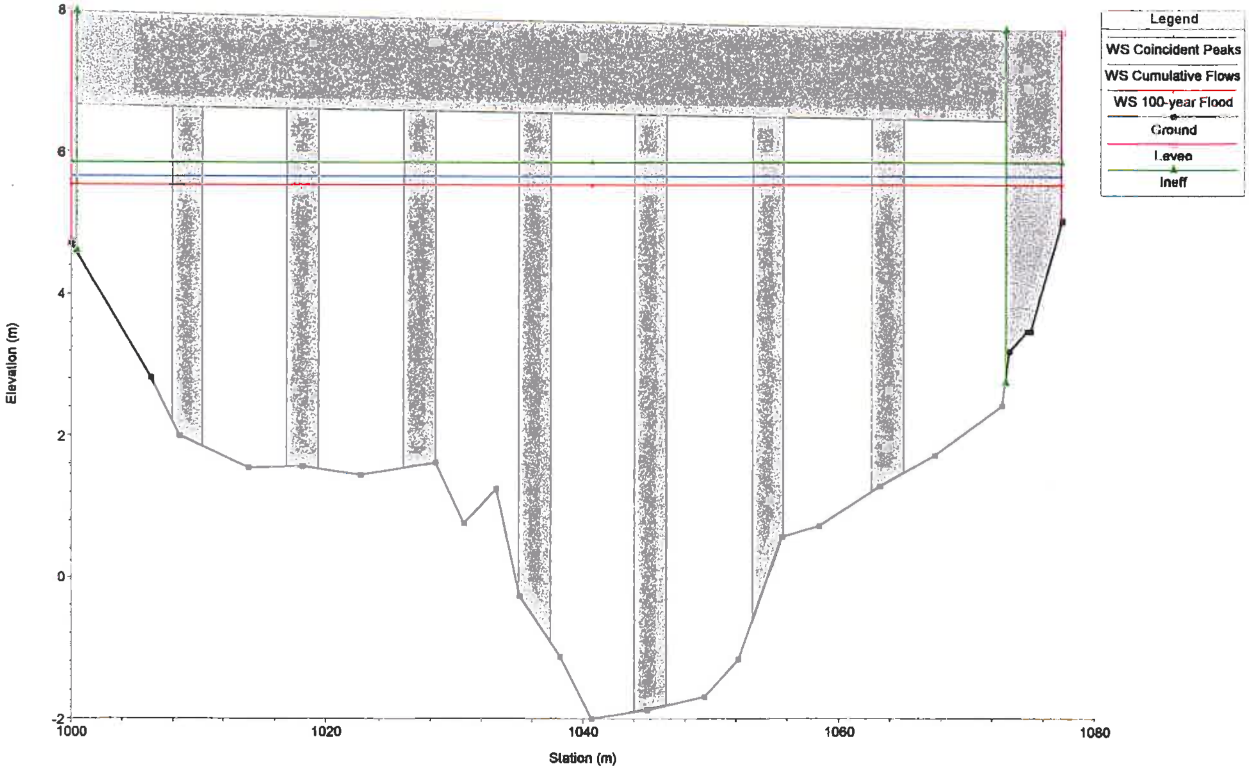


Figure 17. Water Surface Elevations at West Bound 237 Bridge

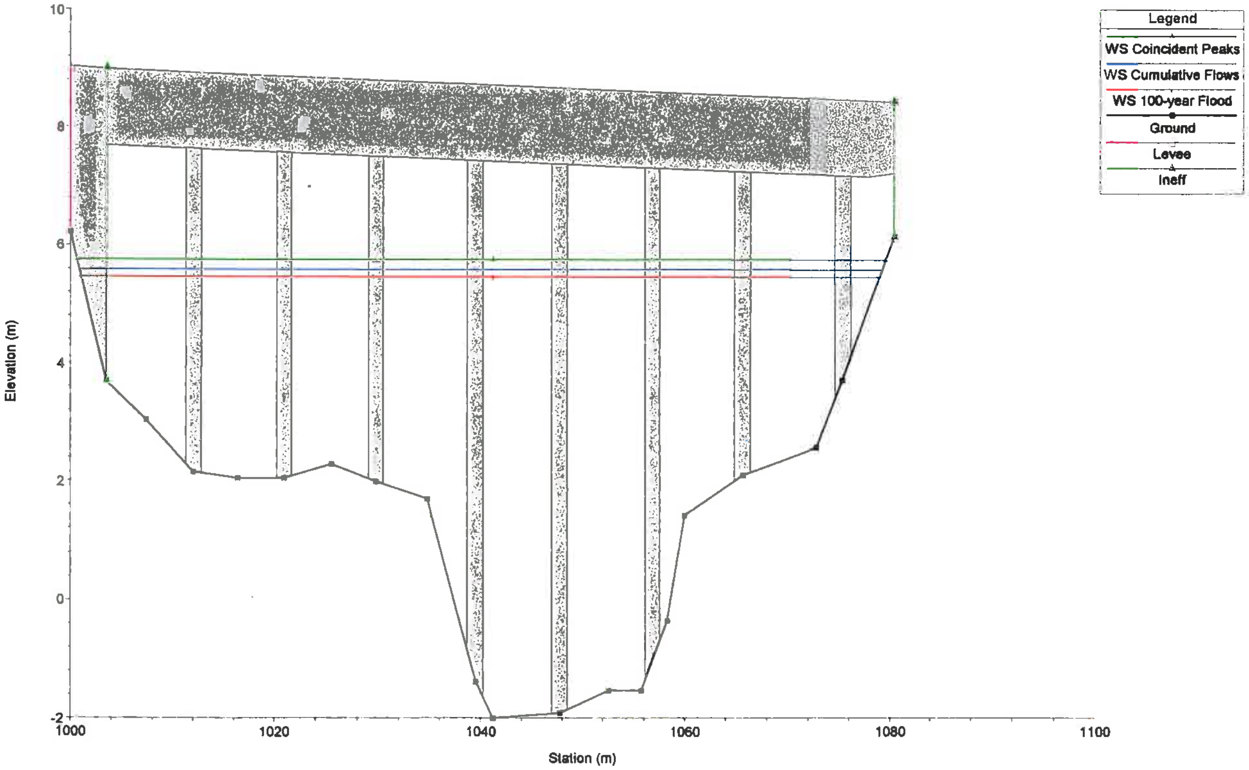


Figure 18. Water Surface Elevations at Gold Street Bridge

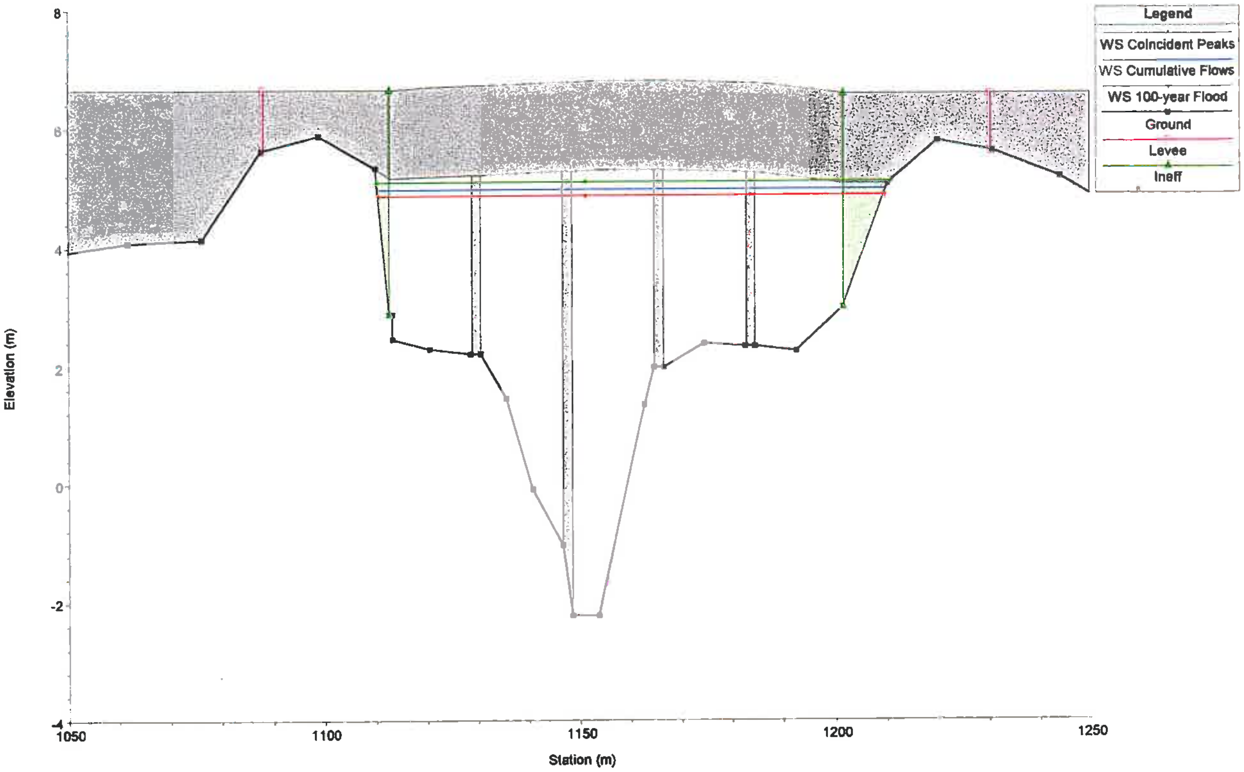
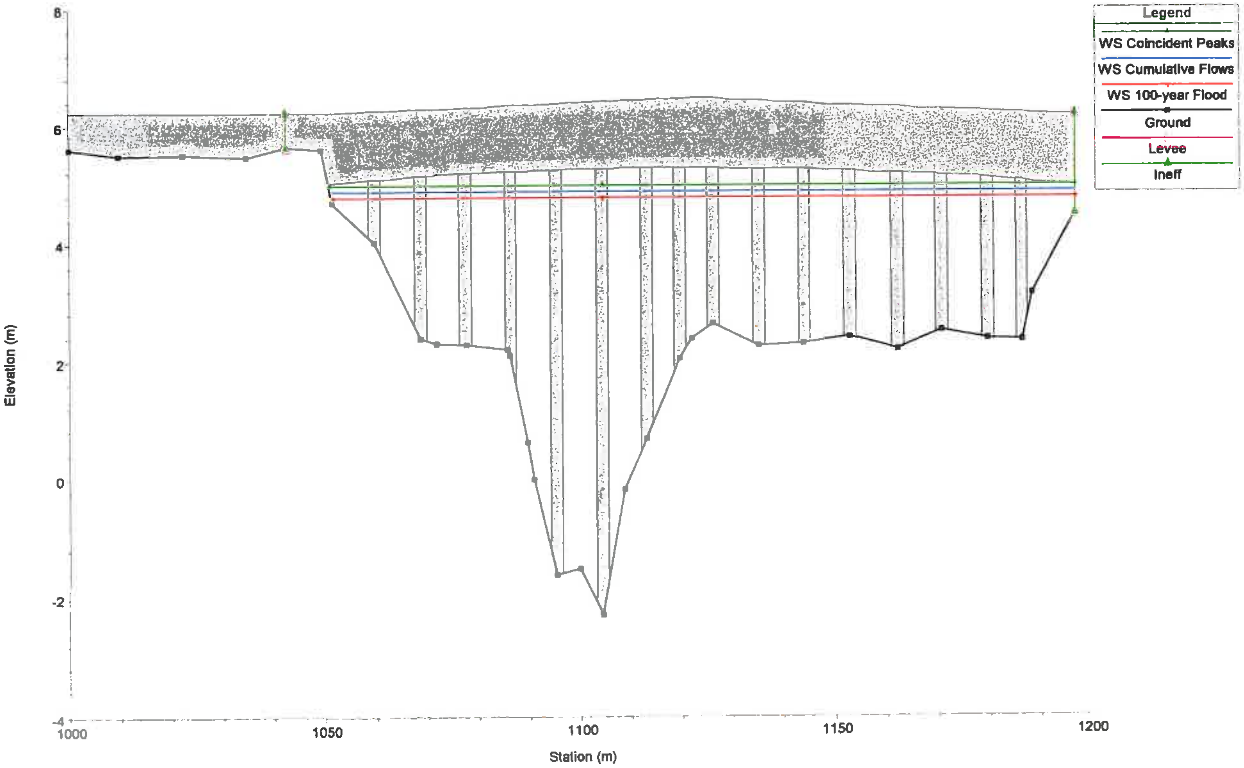


Figure 19. Water Surface Elevations at UPRR Bridge



Effects to Baylands from Adding Interior Drainage Flows to USACE's Design Hydrograph

Purpose

The purpose of the Baylands planning study is to assess and compare existing against proposed LGR Project conditions, including

- design event water surface profiles along Alviso and Guadalupe Sloughs
- the volume and depths of excess water that drains into the salt ponds west of Alviso Slough during the design event
- develop conceptual Baylands components (mitigation improvements) to mitigate for potential LGR-project-induced hydraulic impacts to the Baylands

Previous analyses of the LGR Project and the Baylands did not include interior drainage (between I-880 downstream to UPRR) as part of the design event hydrograph. Therefore, the purpose of the specific analyses reported herein is to identify "interior drainage-induced" hydraulic impacts to the Baylands (e.g., changes to water surface elevation along Alviso Slough and depths of ponding in the salt ponds).

Methods

Preceding discussions describe the methods used to estimate flow contributions from the most significant pumped or gravity drain inflows found downstream of I-880. Modeling methods used to assess the hydrodynamics of the Baylands are reported in previous documents provided by CH2M HILL and the District.

Summary of Findings

Five different hydrologic scenarios are analyzed to identify possible hydraulic impacts to the Baylands resulting from project improvements to the LGR upstream of the UPRR Bridge:

Scenario 1. Present-Day, Pre-project, No LGR Interior Drainage (PDPPNoID). This scenario represents the present-day (existing) conditions excluding any LGR interior drainage inflows between I-880 and the UPRR Bridge. And, the LGR can only deliver a peak flow of 14,000 cfs to Alviso Slough under this scenario.

Scenario 2. Present-Day, Pre-project (PDPP). This present-day, pre-project scenario assumes that the present LGR channel capacity upstream of UPRR can only deliver a 14,000-cfs peak discharge hydrograph to Alviso Slough. Interior drainage is included up to that point at which the LGR discharges reach 14,000 cfs, whereby any flow above the 14,000 cfs, whether riverine or interior drainage leaves the system and does not reach the UPRR bridge and does not enter Alviso Slough.

Scenario 3. USACE Design Hydrograph with No Interior Drainage and No Engineered Weir (USACE-NoIDNoW). This scenario uses the USACE design hydrograph with no interior drainage added to the design hydrograph downstream of I-880. This hydrograph is the four-day "LCA" 17,000-cfs peak-discharge hydrograph delivered to the LGR at I-880 from the flood control project being implemented between I-880 and I-280 through Downtown San Jose, California. This scenario also excludes construction of a 1,000 linear foot engineered weir between Alviso Slough and Cargill Pond A8. This scenario also assumes that the east Alviso Slough levee from UPRR to the County Marina including the Marina perimeter have been improved to eliminate the flood threat to Alviso from high flows in Alviso Slough.

Scenario 4. USACE Design Hydrograph with No Interior Drainage (USACE-NoID). This scenario uses the USACE design hydrograph excluding interior drainage entering the LGR downstream of I-880 (USACE-NoID). This scenario delivers the same 17,000-cfs-peak-discharge hydrograph to Alviso Slough as Scenario 3, however, Scenario 4 includes a 1,000-lf engineered weir between Alviso Slough and Cargill Pond A8 to reduce hydraulic impacts (flow, stage and velocities) to Alviso Slough downstream of the County Marina to essentially pre-project conditions.

Scenario 5. USACE Design Hydrograph with Interior Drainage (USACE-WithID). This scenario combines the USACE-design hydrograph with inflows from fourteen interior drainage locations discussed above. The USACE-WithID scenario increases the LGR peak flow to approximately 18,350-cfs and delivers a greater event volume to the Baylands compared to the USACE-NoID conditions (Scenarios 3 & 4).

Figure 20 shows the LGR inflow hydrographs used in modeling the above five (5) scenarios. (Note that Scenarios 3 and 4 use the same LGR inflow hydrograph.)

Key Results: Following is a summary of key results from this study of the effects of five hydrologic scenarios in the Baylands:

- Table 5 summarizes the inundation depths to Cargill ponds and the USFWS Refuge (pond A6) for the five (5) different scenarios described above. Depths for the Cargill ponds are rounded to the nearest half-foot, and to the nearest quarter-foot for the Refuge (pond A6). Also listed in Table 5 are the peak discharges assumed for each scenario, the estimated event volumes based on 4-day event duration and a summary of other hydrologic boundary conditions used for each scenario.

- Table 6 shows the actual computed inundation depths in each pond to the nearest 1/100 of a foot as shown in Table 5. NHC believes that the computed results are accurate only to the nearest ½ foot as stated in Table 5.

- Figure 21 shows the actual computed inundation depths for Ponds A5-A8 and the Refuge.

- Table 7 shows the maximum computed water surface elevations in the various ponds for each of the five scenarios, as well as the pre-storm starting elevation for each pond.

- Table 8 shows the estimated stormwater volumes that "spill" into each of the ponds and the Refuge for each of the five hydrologic scenarios. Values shown in Table 8 are "net" volumes after the 4-day storm simulation period, only. Some storage locations receive more volume above these values during the event, but have "leaked" a portion of that volume either into adjacent storage areas (ponds) or out into one of the sloughs.

- Table 9 and Figure 22 summarize the approximate 4-day volumes and peak discharge rates across the Alviso Slough-to-Pond A8 overflow (weir) for the five scenarios.
- Table 5 shows that adding interior drainage volume to the existing conditions hydrograph results in an increased inundation of Cargill Ponds A5-A8 by about a half-foot of water (comparing Scenarios 1 & 2). Adding interior drainage volume to the USACE LCA hydrograph (comparing Scenarios 4 & 5) results in about a half-foot increase in inundation to Cargill Ponds A7 and A8(dry), as well as an increase of about 1.25 feet to the USFWS Refuge. Although Table 5 indicates that the USFWS Refuge is not impacted under Scenario 3, it is important to acknowledge that modeling results showed that inundation of Ponds A5 and A7 was at the very top of the Refuge levee with no freeboard to spare.
- Depths of inundation in Ponds A5, A7, and A8 increased by about one foot between existing conditions and USACE LCA Project conditions (comparing Scenarios 1 and 3).
- Inclusion of interior drainage into the LGR Project (Scenario 5) results in inundation of the Refuge to a depth of approximately 3.25 feet. The refuge does not flood in either Scenarios 1, 2 or 3.
- Approximately 4,500 AF of runoff volume is added to the USACE LCA design hydrograph if interior drainage effects are added downstream of I-880. Approximately 2,100 acre-feet (roughly 47 percent) of this added volume spills over the engineered weir into Cargill Ponds A5, A7, and A8 and the Refuge. The result is increased ponding depths in A5, A7, and A8 and an additional 1.25 feet of ponding in the Refuge to a total depth of approximately 3.25 feet. (Refer to Table 5 and Table 9, Scenarios 4 and 5.)
- The estimated total flood storage capacity of the Cargill Ponds A5, A7, and A8 (with no freeboard and without impacting the Refuge) above their present dry-ground or existing salt-pond elevations is approximately 11,600 acre-feet (AF). Under present-day conditions excluding LGR interior drainage (Scenario 1), approximately 8,300 AF spill into Ponds A5, A7, and A8 (Table 9 and Figure 22). Under Scenario 2, approximately 9,100 AF spill into Ponds A5, A7, and A8 without impacting the Refuge (Pond A6). In Scenario 3, approximately 9,800 AF spill into Ponds A5, A7, and A8. Under Scenario 4 which introduces the engineered weir mitigation measure between Alviso Slough and Pond A8, approximately 12,200 AF spill into A5-A8. Because this volume is greater than the flood capacity of Ponds A5, A7 and A8, the results indicate some flooding into the Refuge to a depth of approximately 2.0 feet. Scenario 5 results in approximately 14,300 AF spilling into the ponds resulting in about 3.25 feet inundating the Refuge. Under Scenario 5 excess flood waters entering A5-A8 spill into the Refuge with some flow draining back over the levees into Alviso and Guadalupe Sloughs near the peak of the design event. (Refer to Table 9 and Figure 22.)
- Present conditions exclude the "engineered weir" on the west levee adjacent to Pond A8. In the past, only a low section of levee functioned as a default weir allowing a portion of the high-river flows passing Alviso to spill to the west over the low section in the levee. One of the proposed project mitigation components is an engineered weir to replace the default low section. Preliminary analyses show that a 1,000-foot-long, multi-crested weir is required to maintain pre-LGR Project water surface profiles along Alviso Slough downstream of the County Marina. Construction of such a weir may also lower the project design water-

surface profile near Gold Street Bridge and UPRR Bridge by as much as 0.5 feet. Further detailed design studies are required to verify the actual dimensions, orientation and performance of this concept plan.

- Figure 23 compares computed water surface profiles in Alviso Slough for (1) present-day pre-project conditions, (2) USACE design conditions excluding interior drainage and without an engineered weir, (3) the LGR Project with interior drainage but without an engineered weir, and (4) the LGR Project including interior drainage with the engineered weir included (Scenarios 2, 3, & 5). No freeboard allowance currently exists along Alviso Slough for present–day conditions and will not be provided following with-project improvements. The marked areas adjacent to the weir in Figure 23 indicate locations where NHC made "glass wall assumptions" to simulate the "filling in" of low sections along the west levee to avoid floodwater from flanking the 1,000-foot weir. The need and methods to fill these areas will be determined during detailed design. The height of the assumed in-fill of these areas was set at one foot above the (LGR Project with weir in-place) water surface elevation. If the adjacent levee crowns are not raised to isolate the weir, the tops of those exposed levee crowns and the back sides of the levee will need armoring to accommodate overtopping without erosion. Due to the low probability of the magnitude of a design event, armoring in-place without much filling may be the most reasonable and economical option for these low spots. Further consideration of this option will be made during final design.
- As a means to evaluate options for mitigating the inundation impacts to Ponds A5 through A8 and the Refuge, computations were made to evaluate pumping as a means to restore ponds to their pre-storm water surface elevations, or complete evacuation in the case of the Refuge or Pond A8(dry). A 50-cfs capacity pump size was assumed. Ponds A5, A7, A8(dry) and A8(wet) were assumed to have one pump each, and the Refuge was given two (2) pumps to accelerate the pump-out, for a total of 6 pumps running simultaneously. It was assumed that pumping would commence 14 days after the end of the 4-day design storm event, and pumps would then run continuously until pre-storm conditions are re-established.
- Figure 24 shows the results of the pumping analysis. With six 50-cfs capacity pumps, the evacuation durations for ponds A5, A7 and A8 (dry and wet) are 44 to 54 days, and about 24 days for the Refuge.

Baylands Hydraulic Analysis

A UNET model developed by NHC is used as a planning tool to evaluate the unsteady hydraulic characteristics of the 25-square-mile Baylands study area. This UNET model allows for analysis of the effects of unsteady flow conditions associated with various phased inflow hydrographs, downstream tidal boundary conditions, and the exchange of excess floodwaters into or out of storage areas (predominantly Cargill salt evaporation ponds). Following is a summary of the hydraulic boundary conditions used for the Baylands analyses and a brief listing of key exclusions or limitations of these analyses.

Boundary Conditions. The following list summarizes the common assumptions and boundary conditions used for all scenarios as well as present-day (existing) conditions analysis, LGR

Project conditions analysis excluding the interior drainage flows downstream of I-880, and LGR Project conditions analysis including interior drainage flows downstream of I-880.

Common Assumptions and Boundary Conditions Used for All Scenarios

A. A four-day-duration flood event is used to analyze the Baylands hydraulics. This allows for simulation of the USACE's two-day Guadalupe River hydrograph (extended to 4 days for these analyses) as well as the USACE's four-day Coyote Creek hydrograph including a lag in the Coyote Creek hydrograph.

B. Hydrographs for the Coyote Creek and Guadalupe Slough tributaries (San Tomas, Calabazas, Sunnyvale East, and Sunnyvale West) are shown in Figure 25 and Figure 26.

C. The Coyote Creek 1-percent event hydrograph is based on the USACE's Coyote Creek Project design hydrograph and is lagged by eleven (11) hours with respect to the peak of the LGR hydrograph.

D. The tide boundary condition at Dumbarton Bridge (the downstream boundary of the Baylands UNET model) is a 10-year tide (see Figure 27). The 10-year-tide shape is based on the historical tide that occurred during the March 1995 flood event. The 10-year-tide peak, prescribed by the USACE, is produced by amplifying all hourly tide ordinates above the mean tide level by the ratio of the peak 10-year USACE tide estimate and the peak tide produced during the March 1995 storm tide. Tide ordinates below mean tide level were not modified. The 10-year tide series was then translated to synchronize the peak tide stage to within an hour of the LGR peak flow rate entering Alviso Slough. The result is a design tide that includes conditions associated with high river discharge conditions entering the bay, low pressure in the South Bay, and storm surge or setup in the South Bay expected during a major regional storm event.

E. When the design event occurs, simulations assume that all storage volumes in each of the ponds are available and that no storm nesting or antecedent ponding effects existing in the ponds west of Alviso Slough.

F. If river or ponding stages exceed the top of levee elevations in the model, we assume a "glass wall" condition exists and do not account for spills over the levees if they are slightly lower than computed water surface elevations. We do account for spills and levee overtopping (modeled as weir flow) at a few key locations where survey data indicates low spots in the levees.

Present-day (Existing) Conditions Analysis

G. The maximum LGR event discharge entering Alviso Slough is 14,000 cfs, limited by upstream bankfull channel capacity (see Figure 20, Scenario 2).

H. We assume that no engineered improvements have been made in the Baylands study area for the present-day, existing conditions. Floodwaters spilling into the Cargill ponds west of Alviso Slough occur over the existing low section of the west levee across from the Alviso Yacht Club. We assume the accuracy of the computed ponding depths to be within one half foot, however, the level of detail used in the UNET model to depict "Baylands flooding processes under existing conditions" is only as good as the accuracy of the available topographic and bathymetric data.

I. The interior levee that separates the USFWS refuge from Cargill Ponds A5 and A7 was surveyed recently. Results of those surveys indicate that flood waters in Ponds A5 and A7 start to spill into the Refuge at approximately elevation 10.0 feet. We assumed that no improvements would be made to the top-of-levee profile separating ponds A5 and A7 from the Refuge.

LGR Project Conditions Analysis Excluding Interior Drainage Downstream of I-880

J. The LGR design hydrograph contains a peak discharge of 17,000 cfs entering Alviso Slough (see Figure 20, Scenarios 3 & 4).

K. A 1, 000-foot-long engineered weir on the west levee across from Alviso allows controlled overflow from Alviso Slough into Cargill Pond A8. This concept design will be refined during final design of the weir.

L. Improvements to the County Marina parking lot and levees prevent high stages in Alviso Slough from spilling through the marina into Alviso.

M. The interior levee between A8D (dry portion of A8) and A8W (active salt pond evaporator) has been surveyed recently and field data indicates that flows spill across the levee at about elevation 3.0 feet.

N. The interior levee between A8 and A5–A7 has been recently surveyed and the results indicate that flows spill from A8 into A5/A7 at about elevation 3.5 feet.

Boundary conditions **A, B, C, D, E, F,** and **I** above are included in this analysis which does not include the effects of interior drainage.

LGR Project Conditions Analysis Including Interior Drainage Flows Downstream of I-880

O. The with-interior drainage design hydrograph includes a peak discharge of approximately 18,350 cfs entering Alviso Slough (see Figure 20). Boundary conditions **A, B, C, D, E, F, I, K, L, M, N and O** (summarized above) are included in this analysis.

Key Assumptions and Limitations of Baylands Hydraulic Analysis

The results contained herein are for planning purposes and are not suitable for final design or construction. The following is a summary of key assumptions and limitations of the present Baylands analyses:

- All modeling scenarios assume that all slough and interior pond levees remain intact during the entire storm duration and afterwards, even if the levees are overtopped. We assume that prior to construction of any Baylands components that a design-level hydraulic analyses will be performed and the structural integrity of the non-engineered levees will be determined for with-project conditions.

- Levee overtopping or "Leaks" above 10+ foot elevation on the Alviso Slough and A8W levee are possible, but are not presently included in the model. Only the lowest known locations based on existing available surveys are coded as overtopping weir locations in the UNET model.

- Guadalupe Slough contributes some flooding to Ponds A5, A8D, and maybe A7. More up-to-date, top-of-levee profile data is required to more accurately compute the potential contributions from the Guadalupe Slough.

- The occurrence of future subsidence or levee settlement is not included in the analysis.
- Long-term sea level is assumed constant and the possible changes in project performance during future sea level rise in the South Bay is not considered.
- All of the dimensions, sizes, heights, etc. used to depict physical conditions in the models are from existing, readily available data. Some of these data are sparsely spaced and quite old.
- No analyses have been performed to evaluate the system's performance for events greater than the design event described herein.
- The effects of wind setup and waves are not included in any of the analyses. The effects of wind setup and waves during significant storm events should be evaluated during final design.
- The estimated dimensions of the engineered overflow weir are based on tranquil conditions in the interior Ponds (A5–A8). The effects on the weir's performance during rare storm events due to wind-setup and wave-induced tailwater conditions have not been assessed.
- Pump-out durations assume that all six pumps are accessible and function continuously for the full period of pumping following the design event. The durations are also based on continuous (24 hours per day) pumping until full restoration is achieved.

Figure 20. Baylands Analyses LGR Inflow Hydrographs

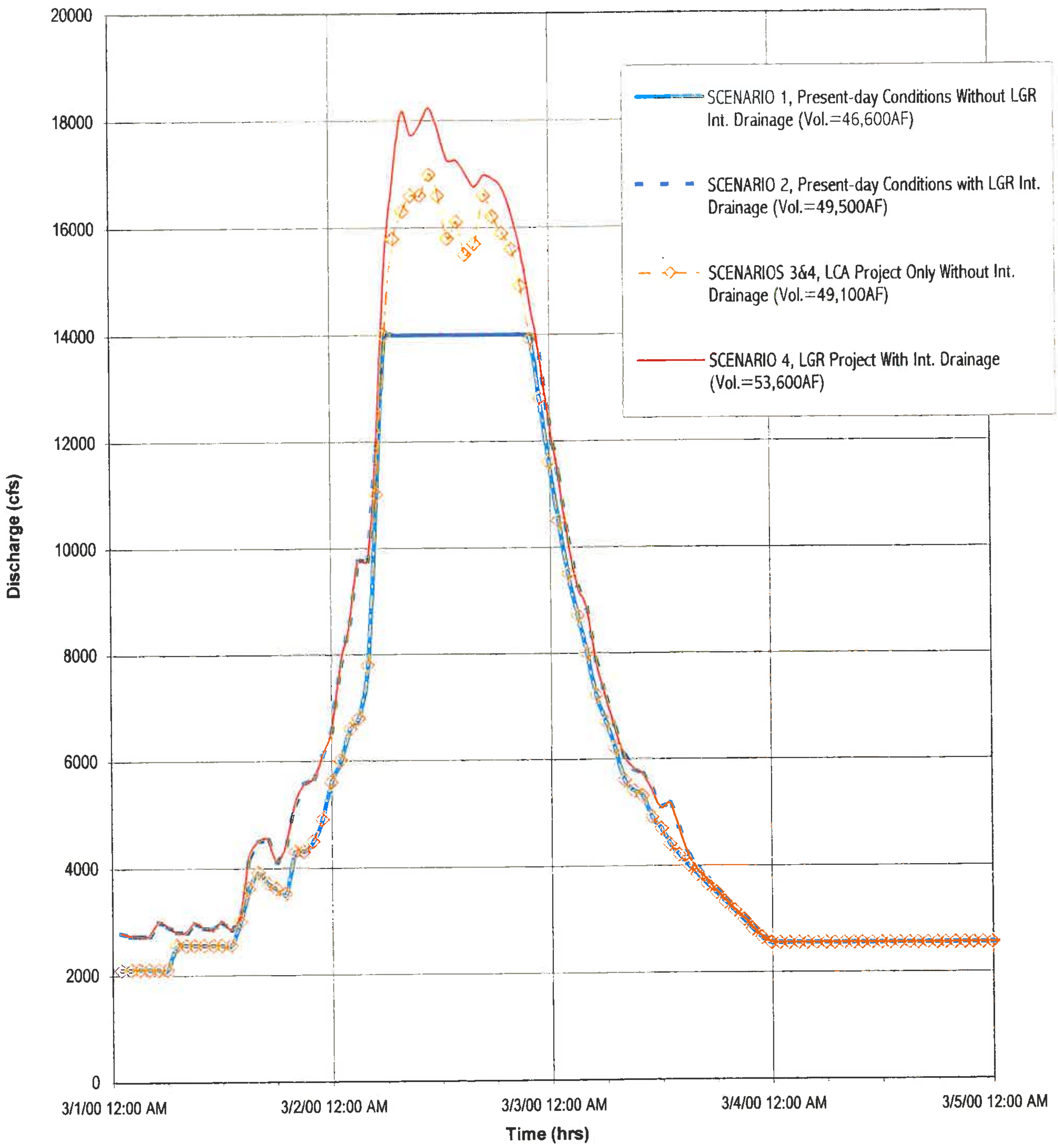


Table 5. Lower Guadalupe River Flood Protection Project
Supplemental Baylands Hydraulic Analysis
Estimated Inundation Depths (5/17/02)

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Existing (Baseline) Conditions Without LGR Pumping	Existing (Baseline) Conditions With LGR Pumping	LCA Hydrograph Without Pumping and No Improved Weir at A8W	LCA Hydrograph Without Pumping and With Improved Weir at A8W	LGR Project With Pumping and With Improved Weir at A8W
LGR Peak Discharge:	14,000 cfs	14,000 cfs	17,000 cfs	17,000 cfs	18,350 cfs
LGR Event Volume*:	46,600 AF	49,500 AF	49,100 AF	49,100 AF	53,600 AF
Other Tributaries:	1% Events	1% Events	1% Events	1% Events	1% Events
Tide at Dumbarton Bridge:	10-Yr	10-Yr	10-Yr	10-Yr	10-Yr
Depth(1) (in Feet) of Inundation for Each Scenario					
Cargill Pond A5	6.0	6.5	7.0	8.0	8.0
USFWS Refuge (A6)(2)	-	-	(3)	*2.00*	*3.25*
Cargill Pond A7	6.0	6.5	7.0	8.0	8.5
Cargill Pond A8(Dry)	6.0	6.5	7.0	8.0	8.5
Cargill Pond A8(Wet)	8.5	9.0	9.5	10.5	10.5
Cargill Pond A9	-	-	-	-	-
Cargill Pond A10	-	-	-	-	-
Cargill Pond A11	-	-	-	-	-
Cargill Pond A12	-	-	-	-	-
Cargill Pond A13	0.5	0.5	0.5	0.5	0.5
Cargill Pond A14	-	-	-	-	-
Cargill Pond A15	0.5	0.5	0.5	0.5	0.5
Cargill Pond A16	-	-	-	-	-
Cargill Pond A17	4.5	4.5	4.5	4.5	4.5
Cargill Pond A3(East)	Nominal(4)	Nominal(4)	Nominal(4)	Nominal(4)	Nominal(4)
Cargill Pond A3(West)	-	-	-	-	-
		R11	R11G	R11H	R11F

* Volume based on 4-day event simulation.

(1) Rounded to the nearest half-foot; effects of wind not accounted for in values.

(2) Rounded to the nearest quarter-foot; effects of wind not accounted for in values.

(3) The water surface in A5 and A7 are right at the very top of the levee, just starting to spill into the Refuge.

(4) Nominal means any computed depth of flooding less than 0.25 feet.

Table 6. Lower Guadalupe River Flood Protection Project
Supplemental Baylands Hydraulic Analysis
Computed Inundation Depths (5/17/02)

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Existing (Baseline) Conditions Without LGR Pumping	Existing (Baseline) Conditions With LGR Pumping	LGR Project Without Pumping and No Improved Weir at A8W	LGR Project Without Pumping and With Improved Weir at A8W	LGR Project With Pumping and With Improved Weir at A8W
LGR Peak Discharge:	14,000 cfs	14,000 cfs	17,000 cfs	17,000 cfs	18,350 cfs
LGR Event Volume*:	46,600 AF	49,500 AF	49,100 AF	49,100 AF	53,600 AF
Other Tributaries:	1% Events	1% Events	1% Events	1% Events	1% Events
Tide at Dumbarton Bridge:	10-Yr	10-Yr	10-Yr	10-Yr	10-Yr
	Depth (in feet) of Inundation for Each Scenario				
Cargill Pond A5	5.95	6.50	7.21	7.87	8.24
USFWS Refuge (A6)				2.05	3.24
Cargill Pond A7	5.99	6.54	7.25	7.94	8.34
Cargill Pond A8(Dry)	5.90	6.45	7.17	7.89	8.32
Cargill Pond A8(Wet)	8.27	8.82	9.54	10.26	10.69
Cargill Pond A9					
Cargill Pond A10					
Cargill Pond A11					
Cargill Pond A12					
Cargill Pond A13	0.26	0.26	0.26	0.26	0.26
Cargill Pond A14					
Cargill Pond A15	0.51	0.51	0.51	0.51	0.51
Cargill Pond A16					
Cargill Pond A17	4.56	4.56	4.56	4.56	4.56
Cargill Pond A3(East)	0.07	0.07	0.11	0.10	0.07
Cargill Pond A3(West)	0.01	0.01	0.01	0.01	0.01

* Volume based on 4-day event simulation.

Figure 21. Computed Inundation Depths
Lower Guadalupe River Flood Protection Project
Supplemental Baylands Hydraulic Analysis

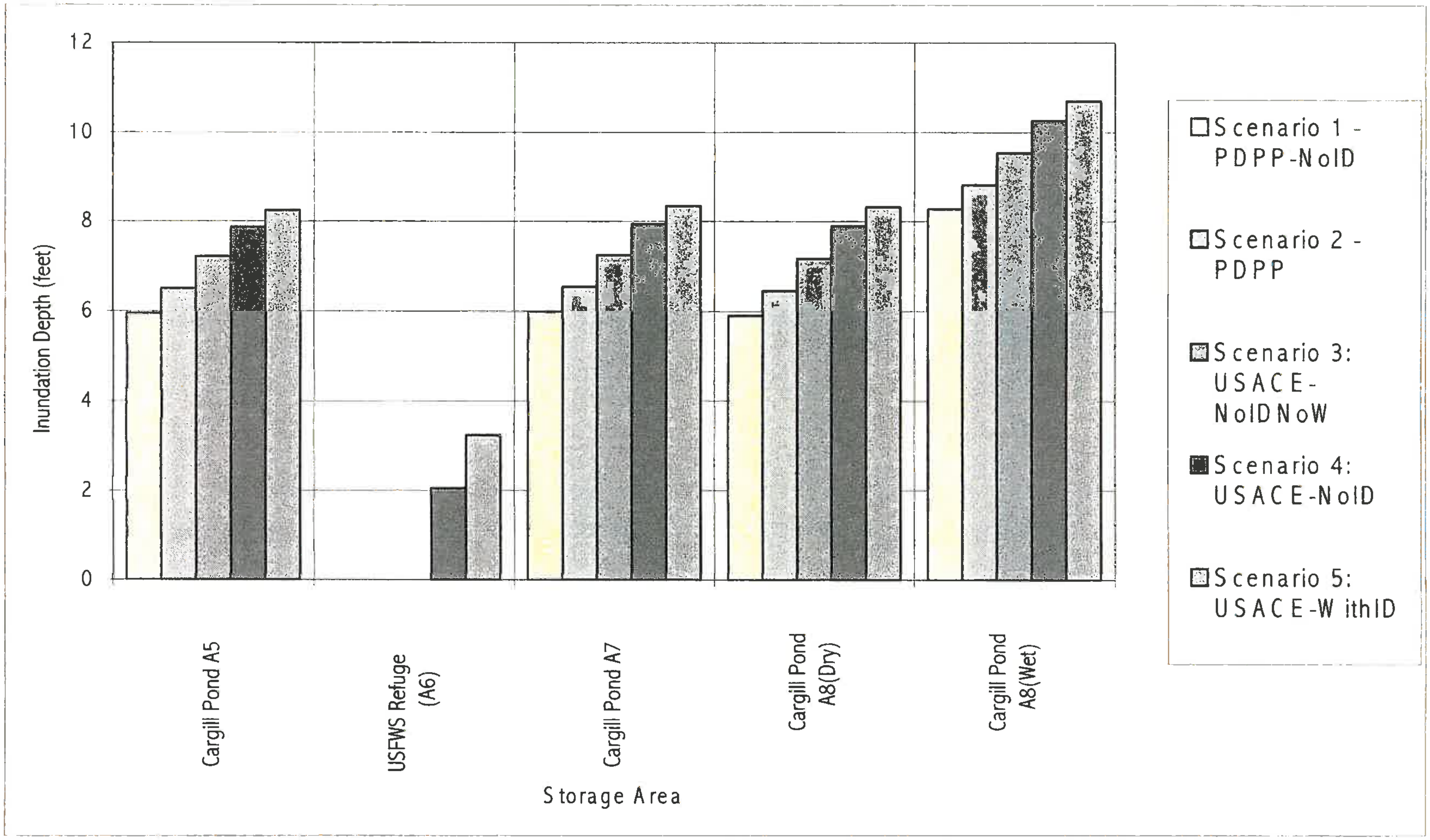


Table 7. Lower Guadalupe River Flood Protection Project

Supplemental Baylands Hydraulic Analysis

Maximum Computed Water Surface Elevations (5/17/02)

		Scenario 1	**Scenario 2**	**Scenario 3**	**Scenario 4**	**Scenario 5**
	Pre-Storm Starting Elevations (feet)	**Existing (Baseline) Conditions Without LGR Pumping**	**Existing (Baseline) Conditions With LGR Pumping**	**LCA Hydrograph Without Pumping and No Improved Weir at A8W**	**LCA Hydrograph Without Pumping and With Improved Weir at A8W**	**LGR Project With Pumping and With Improved Weir at A8W**
LGR Peak Discharge:	-	14,000 cfs	14,000 cfs	17,000 cfs	17,000 cfs	18,350 cfs
LGR Event Volume*:	-	46,600 AF	49,500 AF	49,100 AF	49,100 AF	53,600 AF
Other Tributaries:	-	1% Events	1% Events	1% Events	1% Events	1% Events
Tide at Dumbarton Bridge:	-	10-Yr	10-Yr	10-Yr	10-Yr	10-Yr
	Water Surface Elevation (feet) of Inundation by Scenario					
Cargill Pond A5	2.85	8.80	9.35	10.06	10.72	11.09
USFWS Refuge (A6)	3.00	NC	NC	NC	5.05	6.24
Cargill Pond A7	2.81	8.80	9.35	10.06	10.75	11.15
Cargill Pond A8(Dry)	2.90	8.80	9.35	10.07	10.79	11.22
Cargill Pond A8(Wet)	0.53	8.80	9.35	10.07	10.79	11.22
Cargill Pond A9	-0.32	NC	NC	NC	NC	NC
Cargill Pond A10	-0.84	NC	NC	NC	NC	NC
Cargill Pond A11	4.20	NC	NC	NC	NC	NC
Cargill Pond A12	3.62	NC	NC	3.67	NC	NC
Cargill Pond A13	3.26	3.52	3.52	3.52	3.52	3.52
Cargill Pond A14	-0.06	NC	NC	NC	NC	NC
Cargill Pond A15	5.88	6.39	6.39	6.39	6.39	6.39
Cargill Pond A16	8.20	NC	NC	NC	NC	NC
Cargill Pond A17	8.20	12.76	12.76	12.76	12.76	12.76
Cargill Pond A3(East)	0.85	0.92	0.92	0.96	0.95	0.92
Cargill Pond A3(West)	0.85	0.86	0.86	0.86	0.86	0.86

* Volume based on 4-day event simulation.

NC = No change in elevation from event.

Table 8. Lower Guadalupe River Flood Protection Project
Supplemental Baylands Hydraulic Analysis
Approximate Net Volumes Per Location by Scenario (5/17/02)

		Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Approx. Area of Storage Pond (Acres)	Existing (Baseline) Conditions Without LGR Pumping	Existing (Baseline) Conditions With LGR Pumping	LCA Hydrograph Without Pumping and No Improved Weir at A8W	LCA Hydrograph Without Pumping and With Improved Weir at A8W	LGR Project With Pumping and With Improved Weir at A8W
LGR Peak Discharge:	-	14,000 cfs	14,000 cfs	17,000 cfs	17,000 cfs	18,350 cfs
LGR Event Volume*:	-	46,600 AF	49,500 AF	49,100 AF	49,100 AF	53,600 AF
Other Tributaries:	-	1% Events	1% Events	1% Events	1% Events	1% Events
Tide at Dumbarton Bridge:	-	10-Yr	10-Yr	10-Yr	10-Yr	10-Yr
	Approx. Stormwater Volumes(1) (Acre-Feet) for Each Location by Scenario					
Cargill Pond A5	626.8	3,729	4,074	4,519	4,933	5,165
USFWS Refuge (A6)	342.6	None	None	None	702	1,110
Cargill Pond A7	259.8	1,556	1,699	1,884	2,063	2,167
Cargill Pond A8(Dry)	181.2	1,069	1,169	1,299	1,430	1,508
Cargill Pond A8(Wet)	414.8	3,430	3,658	3,957	4,256	4,434
Cargill Pond A9	360.0	None	None	None	None	None
Cargill Pond A10	260.0	None	None	None	None	None
Cargill Pond A11	264.3	None	None	None	None	None
Cargill Pond A12	311.1	None	None	16	None	None
Cargill Pond A13	270.2	70	70	70	70	70
Cargill Pond A14	344.0	None	None	None	None	None
Cargill Pond A15	253.4	129	129	129	129	129
Cargill Pond A16	242.5	None	None	None	None	None
Cargill Pond A17	133.2	607	607	607	607	607
Cargill Pond A3(East)	448.1	31	31	49	45	31
Cargill Pond A3(West)	536.3	5	5	5	5	5

* Volume based on 4-day event simulation.

(1) These are net volumes after the 4-day simulation period. Some storage locations actually receive more volume than these values, but have "leaked" a portion of the water they've received either into another storage area (or areas), or out into one of the sloughs.

Table 9. Lower Guadalupe River Flood Protection Project
Supplemental Baylands Hydraulic Analysis
Alviso Slough-to-Cargill Pond A8 Peak Discharges and Volumes (5/17/02)

Overflow from Alviso Slough into Cargill Pond A8	Existing (Baseline) Conditions Without LGR Pumping	Existing (Baseline) Conditions With LGR Pumping	LCA Hydrograph Without Pumping and No Improved Weir at A8W	LCA Hydrograph Without Pumping and With Improved Weir at A8W	LGR Project With Pumping and With Improved Weir at A8W
Existing Levee Low Spot					
Peak Flowrate (cfs)	4,700	4,700	6,100		
Net Volume (AF)	8,300	9,100	9,800		
Engineered 1000-lf Weir					
Peak Flowrate (cfs)				7,600	8,500
Net Volume (AF)				12,200	14,300

Figure 22. Alviso Slough to Cargill Pond A8 Overflow Peak Discharges and Volumes

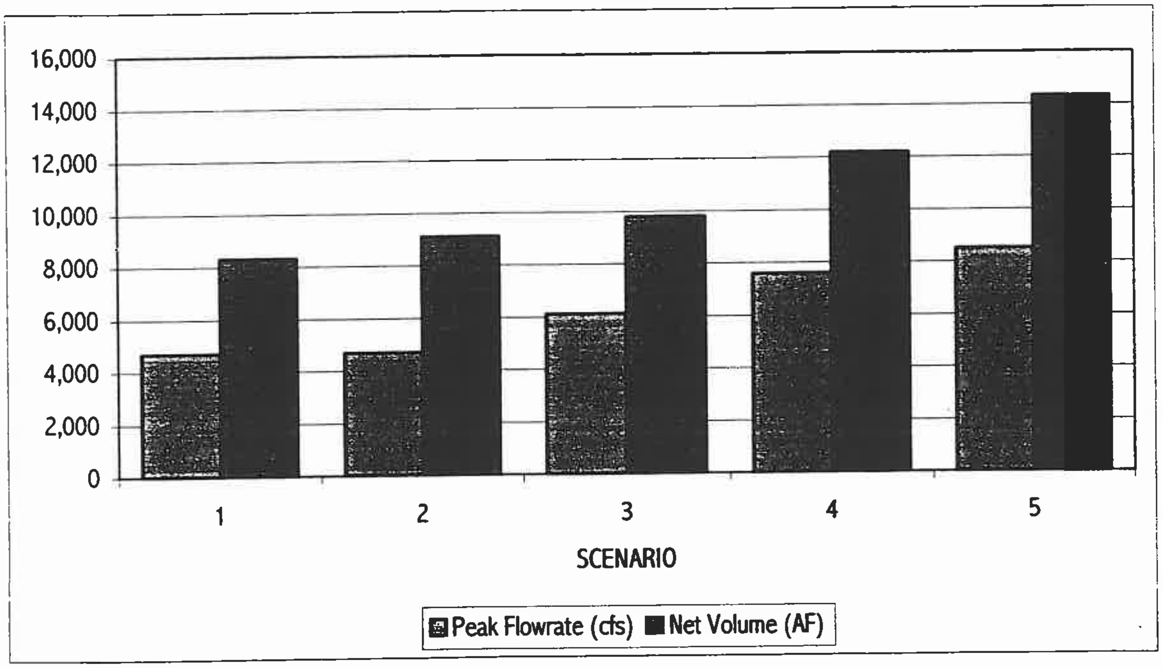


Figure 23. Alviso Slough Water Surface Profile Comparison

Existing Conditions vs. LGR Project Including Interior Drainage

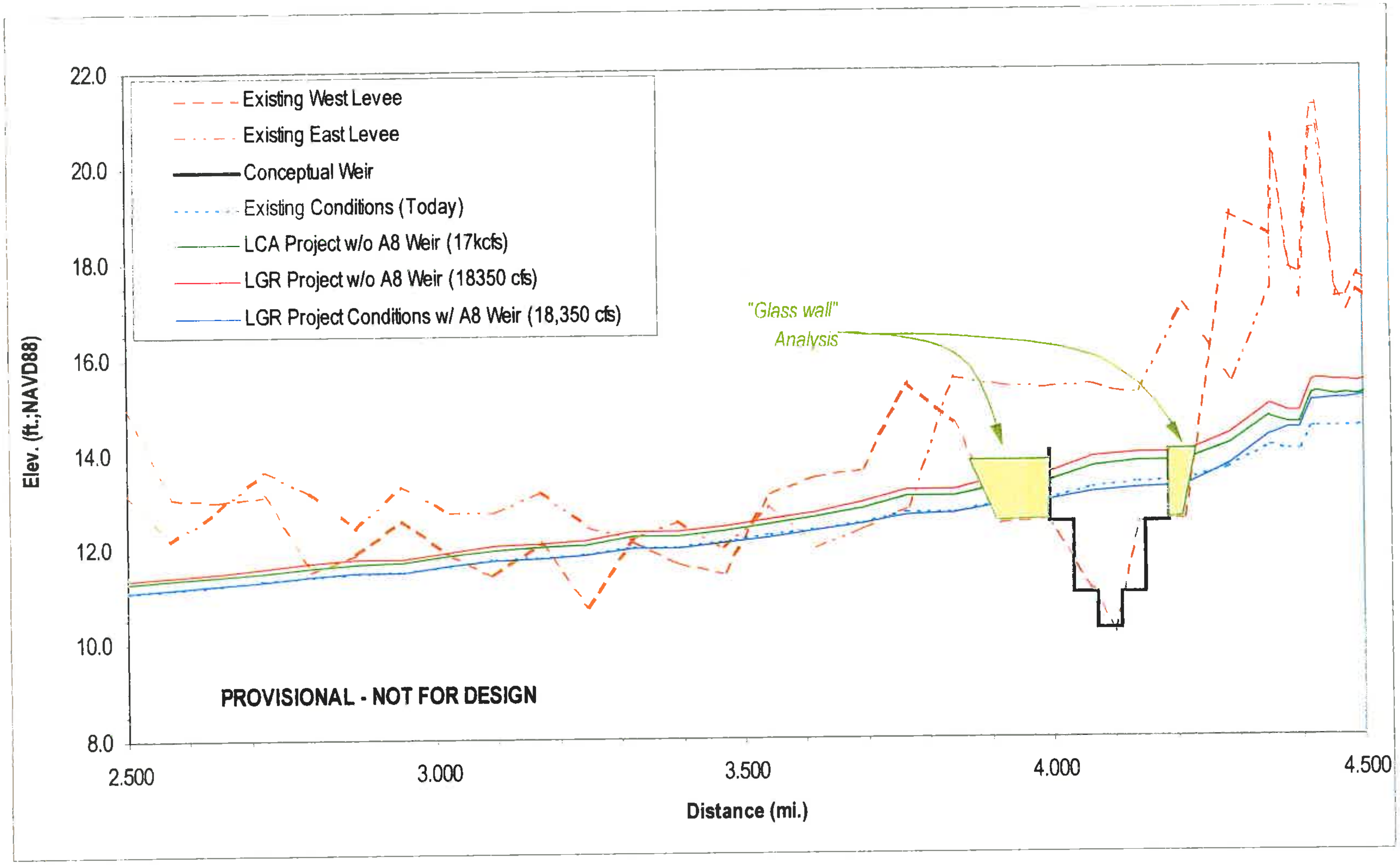
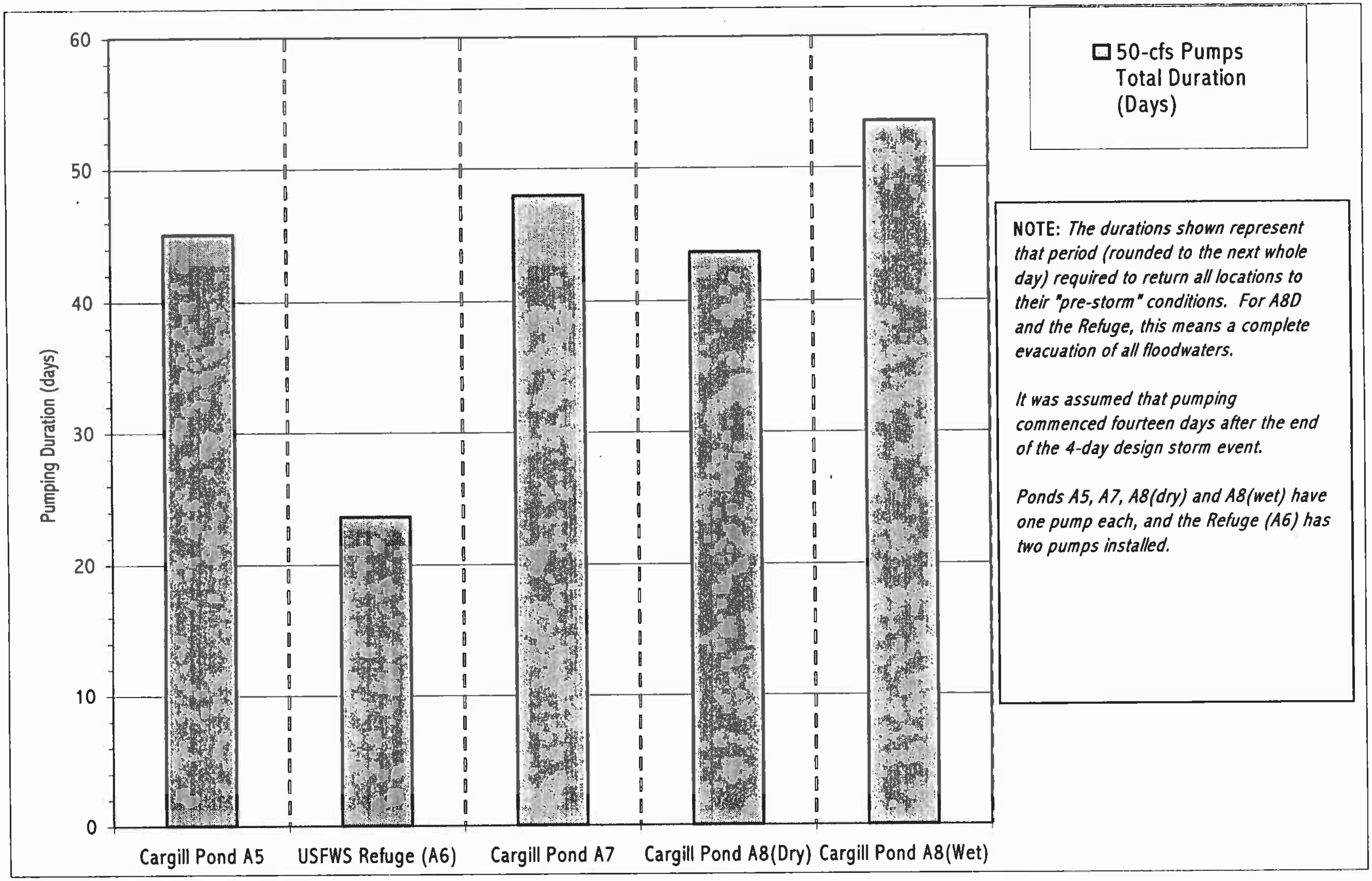


Figure 24. Pump-out Durations for Cargill Ponds A5-A8 and the USFWS Refuge With 50-cfs Capacity Pumping Plants



NOTE: *The durations shown represent that period (rounded to the next whole day) required to return all locations to their "pre-storm" conditions. For A8D and the Refuge, this means a complete evacuation of all floodwaters.*

It was assumed that pumping commenced fourteen days after the end of the 4-day design storm event.

Ponds A5, A7, A8(dry) and A8(wet) have one pump each, and the Refuge (A6) has two pumps installed.

Figure 25. One-Percent Design Hydrograph for Coyote Creek

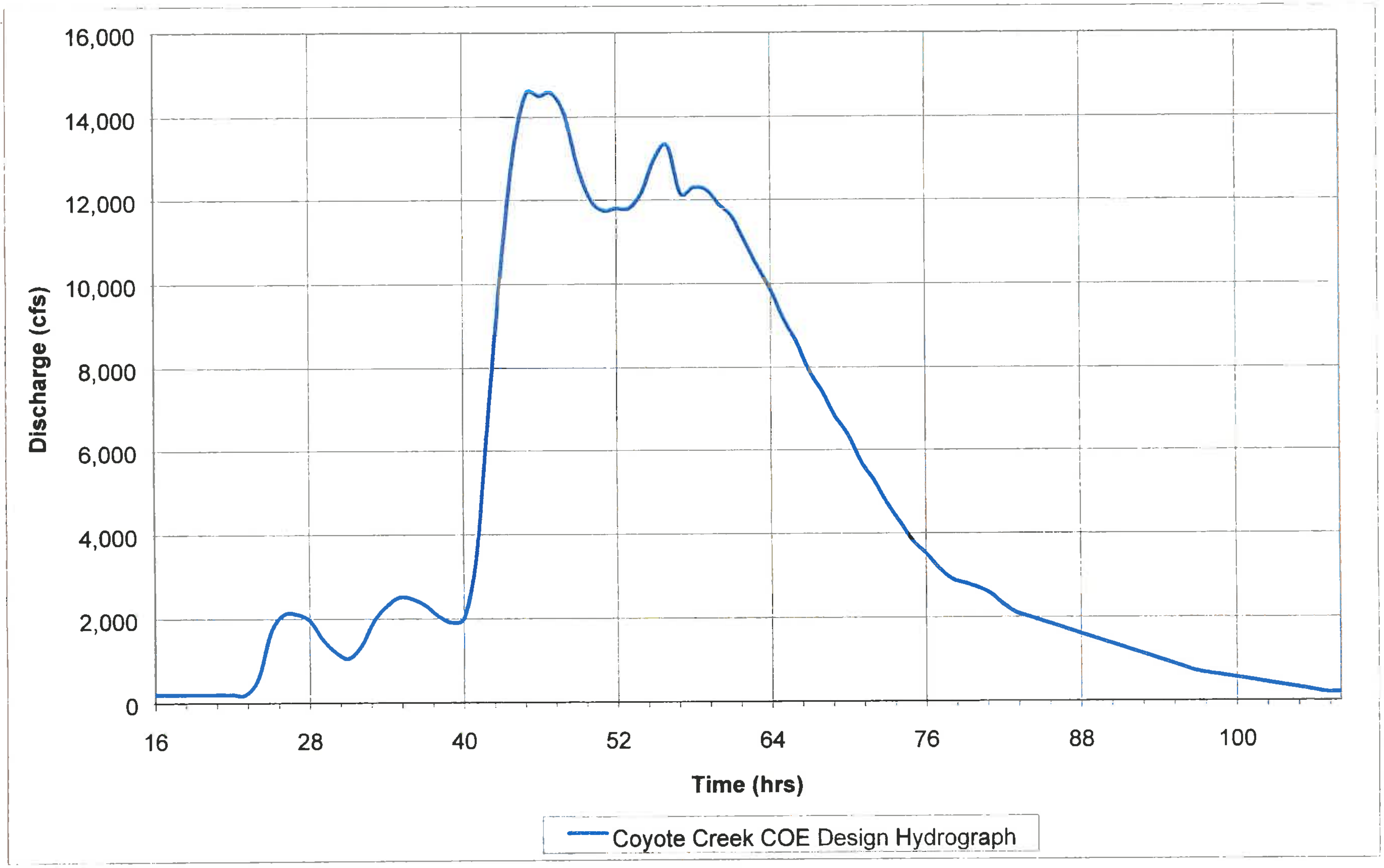


Figure 26. One-Percent Design Hydrographs for Guadalupe Slough Tributaries

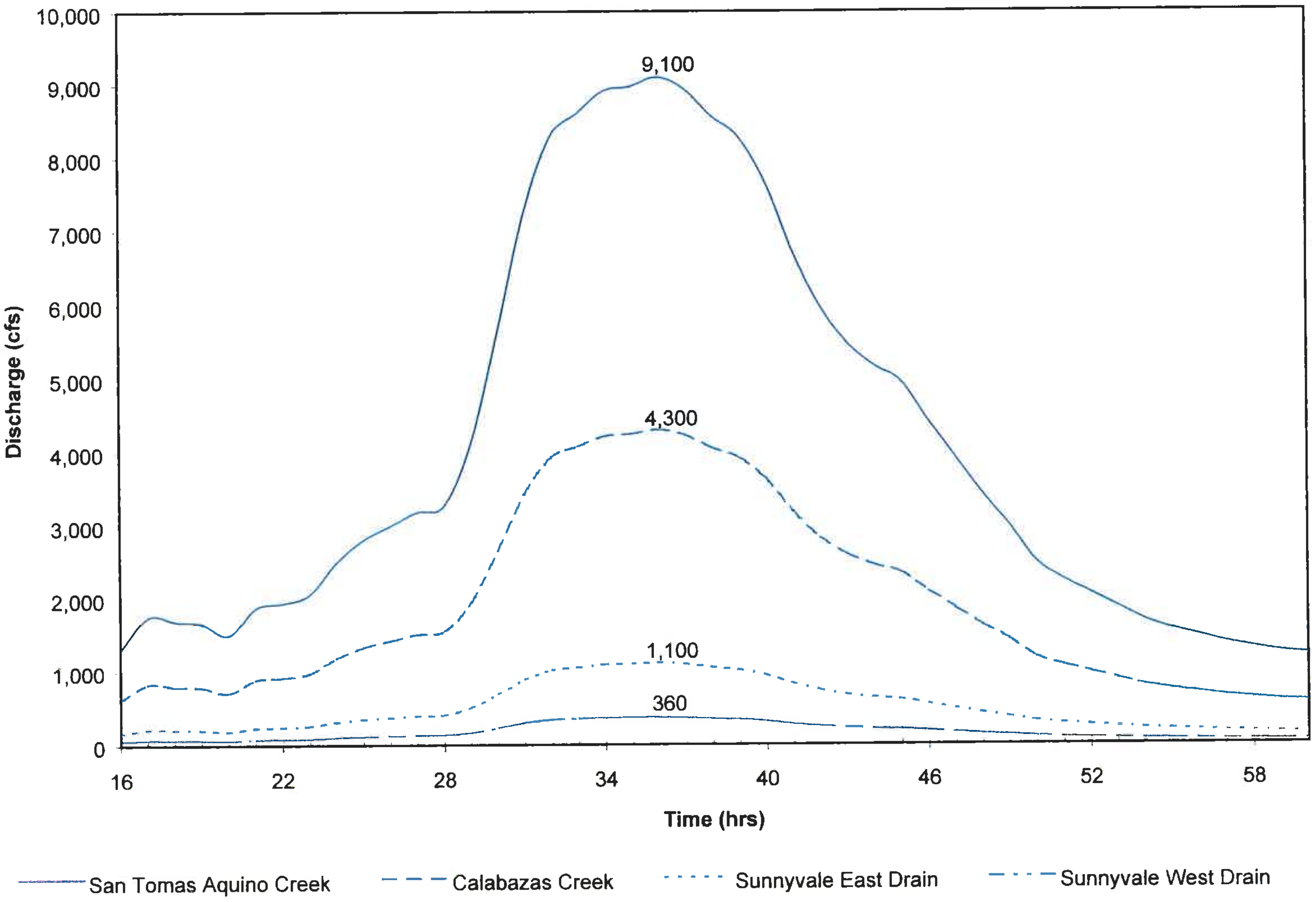
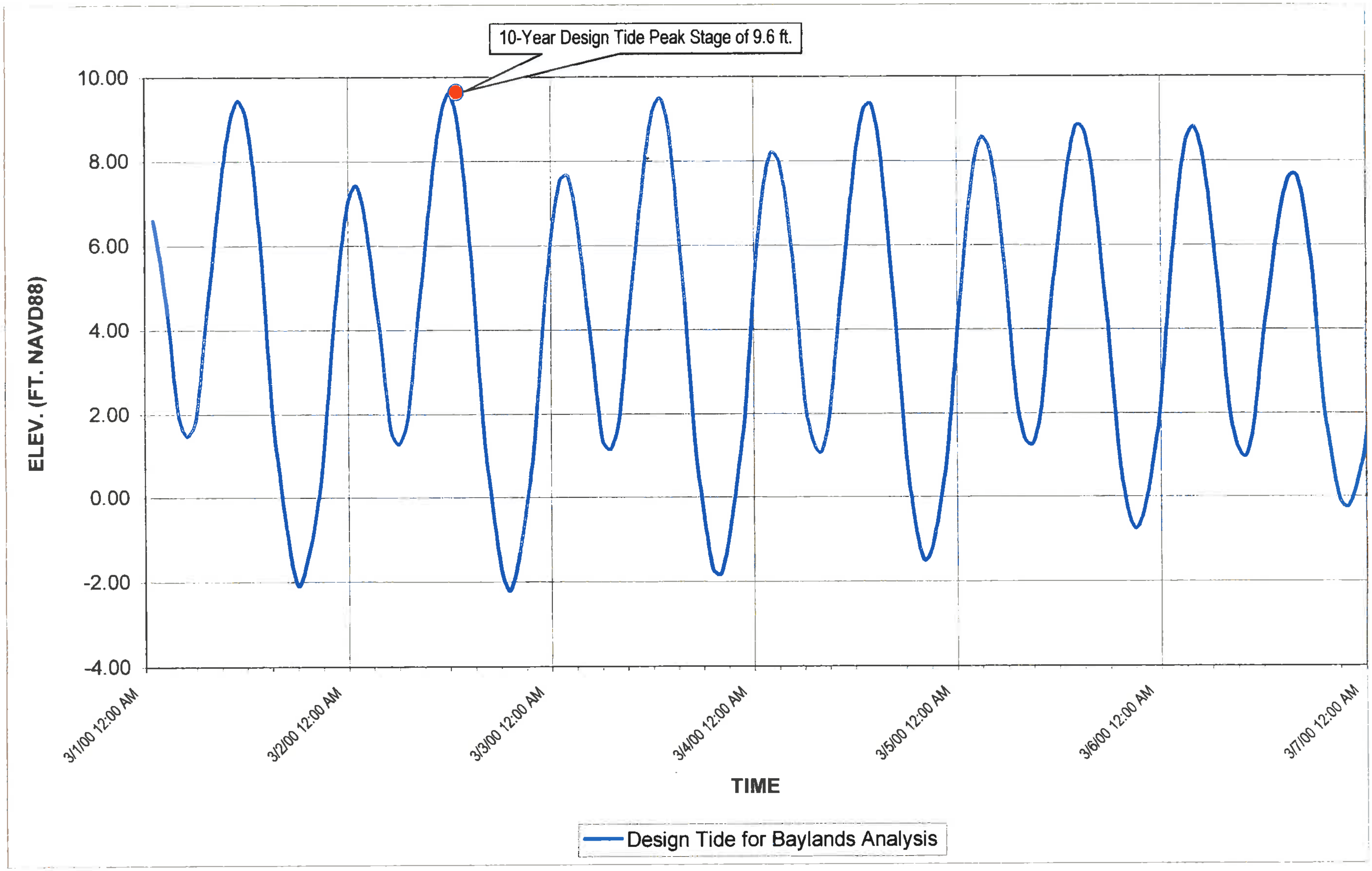


Figure 27. Design Tide at Dumbarton Bridge



Appendix A
Interior Drainage Investigation within the City of San Jose Watersheds

A-N West, Inc.
Jerome de Verrier, PE, Associate Engineer

Findings of the LGR Project Interior Drainage Study within the City of San Jose Watersheds

Purpose

This appendix presents the findings of the hydrologic analyses of selected watersheds (located in the San Jose) that drain into the Guadalupe River from Interstate Highway 880 to Alviso.

Scope of Work

- Confirm pumping capacities, operational parameters, and outfall data for three City of San Jose pump stations (existing Rincon 1 and Oakmead and proposed Rincon 2 pump stations) discharging into the Guadalupe River
- Provide discharge hydrographs for Rincon 1 and Rincon 2 pump stations generated from the USACE 100-year, 72-hour rainfall event. The Oakmead pump station discharge is estimated to be reasonably represented by the Rincon 2 discharge hydrograph
- Review City of San Jose storm sewer system maps and CH2M HILL survey data between Interstate Highway 880 and Alviso to tabulate all gravity outfalls 36 inches in diameter and larger which discharge into the Guadalupe River
- Review the preliminary Guadalupe River hydraulic model results from Northwest Hydraulics to compare the 100-year water surface elevation at the gravity outfalls with ground elevations in the vicinity
- Provide discharge hydrographs using a USACE 100-year, 72-hour rainfall event for significant San Jose gravity outfalls where hydraulic conditions allow outflow

This information will be used to estimate the impact of these local flows on the LGR Project.

Summary of Findings

Study results are summarized in Tables 1 and 2 below:

Table 1 Pump Station Results

Facility	River Station (P-Line)	Pumping Capacity (cfs)	Tributary Area (sq. mi.)	Approx. Time of Conc. (min)	Peak Runoff (cfs)	Peak Discharge to River (cfs)	Occurrence (hrs)	No. of Pumps
Oakmead Pump Station[1]	8+650	670	2.32	-	-	-	-	-
Rincon 1 Pump Station	11+775	360	0.80	37	245	240	35–38	$^{2}/_{3}$
Rincon 2 Pump Station	13+500	600	1.31	45	390	480	34–38	$^{4}/_{5}$

[1] See Pump Station Methodology discussion below

Table 2 - Gravity Outfall Results

Facility	River Station (P-Line)	Outfall Pipe Dia. (in)	Tributary Area (sq. mi.)	Approx. Time of Conc. (min)	Peak Runoff (cfs)	Peak Discharge to River (cfs)	Occur-rence (hrs)
Airport Pkwy (Outfall 612)	15+670	54	0.40	36	120	110	34–38
Sonora Dr. (Outfalls 607/608)	16+700	66 & 78	2.00	72	530	510	35–39
I-880 (Outfalls 623/624)	17+600	54 & 30	1.25	64	340	205	35–39

The USACE 1-percent, 72-hour storm did not generate sufficient runoff to exceed the capacity of the pump stations. In our models, not all pumps turned on at the Rincon 1 and Rincon 2 pump stations.

In all cases, the peak discharge to the river flowing from the gravity outfalls was less than the peak runoff. The capacity of the outfall pipe was determined by calculating a backwater starting from the preliminary Guadalupe River peak-water-surface elevations provided by Northwest Hydraulics. Accounting for pipe friction and junction losses, we determined the slope of the energy grade line that would just barely surcharge the storm drain system beyond the low ground elevations within about 2,500 feet upstream of the outfall.

Note that peak Guadalupe River water surface elevations were used to calculate the backwater. In reality, the river may peak at a different time from the local watersheds; therefore, it is possible for the entire peak runoff to pass through the outfall.

Pump Station Methodology

Data and Assumptions. The storm drain systems for those watersheds that drain via the Rincon 1 and Rincon 2 pump stations have been previously modeled using the computer software application SWMM for the *North San Jose Rincon de los Esteros Storm Drain Master Plan* (see below). The Rincon 1 pump station was constructed in 1999 and is currently in operation. The model assumes that the on and off settings of the Rincon 1 pump are approximately two feet lower than the current settings, which were recently confirmed as part of our scope for this study. A-N West has previously recommended that the City of San Jose modify the Rincon 1 operational parameters defined in *North San Jose Rincon de los Esteros Storm Drain Master Plan Final Report*, dated June 1999 by A-N West, Inc., for the City of San Jose.

The final design plans and specifications for the Rincon de los Esteros Phase II (or Rincon 2 pump station as referred to in this report) was submitted to the City of San Jose in September 2001 but has not yet been constructed. The data we are providing assumes that Rincon 2 pump station is constructed in addition to other planned storm drain improvements as outlined in the above-mentioned *Master Plan Report*.

Several City of San Jose pump stations within the scope limits were omitted from study since their discharge capacity is comparatively small to the pump stations studied. These pump stations are listed in Table 3 below including their approximate combined total capacity.

Table 3. City of San Jose Pump Stations and Their Capacities

Facility	Approx. River Station (*P*-Line)	Approx. Pumping Capacity (cfs)[1]
Alviso Pump Station 12	7+090	0.2
Alviso Pump Station 13	7+210	unknown
Summerset	7+690	21
North First Street	8+000	72
Oakcrest Estates	8+340	12
River Oaks	10+970	67
Gateway	unknown	7
Airport	14+575	50
Airport Parkway Station	15+325	10.5
Combined Total Capacity		**240**

[1] Data from *LGR Levee Operation Draft Emergency Action Plan* by SCVWD, 26 September 2001

Storm Water Management Models (SWMMs). In general, for the purposes of the Master Plan study and therefore this study, SWMM allows the user to input basic hydrologic parameters at selected nodes and generates rainfall hydrographs using any of the popular present-day loss models and routing methods. These flows are then routed through an accurately dimensioned network of unique conduits and pumps. Relevant storage such as wet wells or detention basins can be accounted for. The watershed areas that drain through the Rincon 1 and Rincon 2 Pump Stations were previously modeled for the above mentioned storm drain Master Plan study. The models comprised the pump stations and all storm drain pipes and culverts of 30-inch diameter and larger. The pumps for both stations were modeled as nominal 120 cfs pumps either being on or off depending on wet well water surface elevation. Typically, reinforced concrete pipe was modeled with Manning's n-values of 0.015 and energy losses were accounted for at junctions and changes in pipe size.

Design Rainfall Event. To be consistent with previous and concurrent studies of the LGR, for both our pumped and gravity outfall discharge calculations, we used the USACE 100-year, 72-hour rainfall distribution. All watersheds studied for this report were located in a region of San Jose having a mean annual precipitation (MAP) of 14.0 inches. The watersheds are of a size range such that the total depth of the storm is calculated by taking 48 percent of the MAP and then distributing this depth throughout the 1-percent rainfall pattern. This translates into a total rainfall depth of 6.72 inches. The USACE 100-year, 72-hour rainfall distribution pattern and total depth calculation is discussed in *Hydrologic Engineering Office Report on Guadalupe River and Coyote Creek, Santa Clara County, California*, USACE, June 1977.

The USACE 100-year, 72-hour storm pattern has a peak intensity of only 0.49 in/hr for 1 hour. Both Rincon 1 and Rincon 2 pump stations were designed to accept the peak discharge generated by a 10-year, 24-hour design storm, which has a much higher peak intensity for shorter duration. This explains why not all pumps turn on at these pump stations even though a less frequent design storm was utilized for this study.

Oakmead Pump Station. No hydrologic or hydraulic model was prepared for this watershed. As an approximation, because Oakmead pump station has similar capacity and number of pumps as Rincon 2 pump station (see table above), the discharge hydrograph of Rincon 2 should be reasonably representative of what could be expected to be discharged from Oakmead. To obtain an accurate discharge hydrograph, a hydrologic/hydraulic model would need to be prepared. This was not considered necessary for this level of study.

Gravity Outfall Methodology

Data and Assumptions. Gravity outfalls that are 36 inches in diameter or larger, located between Alviso and Interstate Highway 880, and discharge into the Guadalupe River under the USACE 100-year, 72-hour storm conditions were tabulated. From this list, three separate significant storm drain systems totaling five outfalls were studied.

It was determined that the 66-inch and 78-inch diameter outfalls at Sonora Drive (*P*-line Station 16+700), drained one watershed and therefore could not be separated. In fact, the outfall pipes intersect each other at the same elevation about 1000 feet upstream from the outfalls.

It was also determined that the 54-inch diameter outfall near I-880 (*P*-line Station 17+600) was part of a large and complicated storm drain network that shared an adjacent 30-inch outfall in addition to 66-inch and 30-inch outfalls upstream of I-880 (beyond the study limits). As the summary chart shows, it was necessary to include the adjacent 30-inch outfall to estimate a reasonable peak flow to the Guadalupe River. However, we were able to reasonably segregate the outfalls upstream of I-880 along with their contributing tributary area and to exclude them from this study.

The study of gravity outfalls upstream of I-880 was out of scope for this study.

HEC-HMS 2.1 (Hydrologic Engineering Center's Hydrologic Modeling System), a computer software application, was used to prepare hydrographs from the watersheds at their outfalls. HEC-HMS is the replacement program for HEC-1.

The City of San Jose storm sewer maps were used to define and measure drainage basin areas and time of concentration (t_c) lengths. It was not part of our scope to define subbasins within the overall drainage basin or to route inflow hydrographs through existing storm drain pipes. Our method was to route all flows to the outfall by using a t_c length from the outfall to the furthest inlet. We assumed a nominal 5-feet-per-second velocity within the storm drain conduits. An inlet time was added to estimate the overall t_c based on criteria set forth from the City of San Jose Storm Drain Design Guidelines: 5 minutes for commercial areas or residential areas zoned for greater than 8 dwelling units per acre and 10 minutes for residential areas zoned for 8 dwelling units per acre or less.

Gravity outfalls to Guadalupe River within the scope limits that were either (1) 36 inches in diameter or less, or (2) could not drain due to the high river water surface elevation relative to ground elevations, were omitted from study. Their discharge seems to be inconsequential in the overall LGR Project because of their limited capacity. These outfalls are listed in Table 4 below including their total combined outflow.

Table 4. San Jose Outfalls Omitted from Study

SJ Outfall No.	Approx. River Station (*P*-Line)	Outfall Pipe Dia. (in)		Approx. Max. Flow During Peak River WSEL (cfs)	Reason not Studied
		CSJ Data	CH2M HILL Data		
576	13+650	36	36	31	Outfall small–low flow
680	14+608	78	72	-	River WS high relative to basin ground elevations–can't drain (assume flapgate closed)
681	14+615	54	54	-	River WS high relative to basin ground elevations–can't drain (assume flapgate closed)
683	14+800	36	36	-	River WS high relative to basin ground elevations–can't drain (assume flapgate closed)
686	15+700	54	54	-	River WS high relative to basin ground elevations–can't drain (assume flapgate closed)
611	17+440	36	-	48	Outfall small–low flow
Total				79	

Losses due to Infiltration. Infiltration is estimated based on land use, soil type, and antecedent moisture conditions. We utilized the Soil Conservation Service (SCS) Curve Number method to account for infiltration (Schaaf & Wheeler also used this method for their study of the Santa Clara outfalls). SCS soil maps indicate that the study area is underlain by soils classified as Hydrologic Soil Group *D* and the Antecedent Moisture Condition was assumed to be $I^1/_2$. We utilized the City of San Jose Storm Sewer Maps to determine land-use type limited to either low density/high density residential (CN = 82 assuming 1/3 of area is high density) or commercial (CN = 91). Since the CN values are based on land-use type, the percent of impervious area was assumed to be zero. Again, since the CN values are based on an assumed antecedent moisture condition, initial infiltration was assumed to be zero.

Unit Hydrograph. We used the Clark dimensionless unit hydrograph to generate the runoff hydrographs (as Schaaf & Wheeler, etc.). This method requires two parameters: t_c and a storage coefficient, R. The method used to calculate t_c is explained above. R, in units of time, is estimated from t_c by the following formula (where C generally ranges between 0.1 and 0.5 for urbanized areas):

$$C = \frac{R}{t_c + R}$$

We used a C equal to 0.3, which calibrated well with the peak runoff generated in our SWMM mentioned above.

Appendix B
Interior Drainage Investigation within the City of Santa Clara Watersheds

SCHAAF & WHEELER
Charles D. Anderson, PE, Principal

Study Purpose

This appendix presents the findings of a preliminary hydrologic investigation undertaken regarding local drainage from Santa Clara tributary to the LGR between Interstate 880 and Highway 237. Refinements have been made to correct antecedent moisture conditions typical of 72-hour storms and to utilize design water surface information recently made available. The study of gravity outfalls upstream of I-880 was not in the scope for this study and floodplain mapping and interior flooding analyses were not part of this investigation.

Local drainage is pumped into the river or drains by gravity outfall with flapgate protection. This analysis is the first step in a more comprehensive look at the potential for coincident interior drainage and its impact on the LGR Project. The basic focus of this work is twofold:

- Confirm pump station capacities and operational parameters within Santa Clara
- Provide preliminary estimates of pump station and gravity outfall discharge hydrographs during the design 72-hour, 1-percent storm event as previously prescribed by the Corps of Engineers. This information will be used by others to assess project impacts resulting from additional discharges into the Guadalupe River downstream of Interstate 880.

Depending upon that impact assessment, the work described herein may be refined and used to gage the impact of potential emergency operating plans on local drainage conditions behind the Guadalupe River levees. This report also discusses additional information and analyses that would be needed to better examine local drainage issues.

Summary Of Findings

Existing drainage facilities in Santa Clara appear to accommodate the design 72-hour, 100-year precipitation event on the LGR, with the exception of the Laurelwood pump station, which limits discharge to its maximum pumping capacity, and the Trimble Road outfall, where discharge capacity is limited by river stage. Table 1 lists the pertinent drainage facilities in Santa Clara, the approximate river station at their outfall, peak local runoff to the facility, peak discharge to the river, the time of peak discharge, and in the case of pumping facilities, how many pumps are in operation at the time of peak runoff.

Table 1. Summary of Santa Clara Facilities

USACE 72-hour, 100-year Storm

Facility	River Station	Peak Local Runoff (cfs)	Peak Discharge to River (cfs)	Timing of Peak Discharge (hours)	No. of Pumps in Operation
Eastside Pump Station	264+00	220	100	32 - 56	3 of 3
Fairway Glen Pump Station	332+00	160	170	35 - 42	2 of 3
Lickmill Pump Station	386+00	200	230	36 - 39	3 of 3
Nelo-Victor Pump Station	410+00	90	110	35 - 38	2 of 3
Laurelwood Pump Station	425+00	180	130	35 - 50	3 of 3
Trimble Outfall	460+00	350	280	37 - 39	n/a

(The referenced information applies *only* to the USACE storm pattern. Also, the analysis reflects an increase in the Nelo-Victor pump station's capacity from 60 cfs to 160 cfs by winter 2003.)

Background

When the USACE estimated design 100-year discharges for the LGR, their analysis stopped at the river's confluence with Los Gatos Creek, so the flood protection project is currently designed to carry 17,000 cfs with FEMA-level freeboard. However, significant areas are tributary to the Guadalupe River downstream of Los Gatos Creek, both in Santa Clara and San Jose. Much of this drainage area is protected by levees. Also, the natural topography, which tends to fall away from the river, has necessitated the construction of several pumping facilities.

The current design peak discharge does not allow for additional runoff to be pumped into the river without compromising freeboard. Consequently, one potential design element of the LGR Project is to develop an emergency action plan (EAP) and emergency operating plan (EOP) to control the timing and rates of interior pumping to the LGR during extreme runoff conditions.

Prior to developing such plans, however, the Santa Clara Valley Water District (District) and its consultants need to evaluate the operation of these local facilities in light of two factors:

- How local hydrology and the timing of pumped discharges affect river flow and design freeboard downstream of Los Gatos Creek.
- Changes to the risk of local flooding (duration and depth of ponding) that might result from implementing the EAP and EOP during a major runoff event on the LGR. Eventually this type of analysis will need to be performed to obtain a letter of map revision from FEMA.

After a brief discussion of Santa Clara's drainage facilities tributary to the LGR, we developed the preliminary methodologies presented herein.

Drainage Facilities

Six major outfalls drain Santa Clara's tributary areas to the LGR. At five of these outfalls, stormwater pumps are available to lift water against high LGR stage. In addition drainage basins directly tributary to the LGR, some overflow from the Rambo and Gianera basins, which normally drain to San Tomas Aquino Creek, are intercepted by Eastside basin storm drains and pumped into the Guadalupe River. Table 2 summarizes each drainage area.

Table 2. Summary of Interior LGR Drainage Basins in Santa Clara

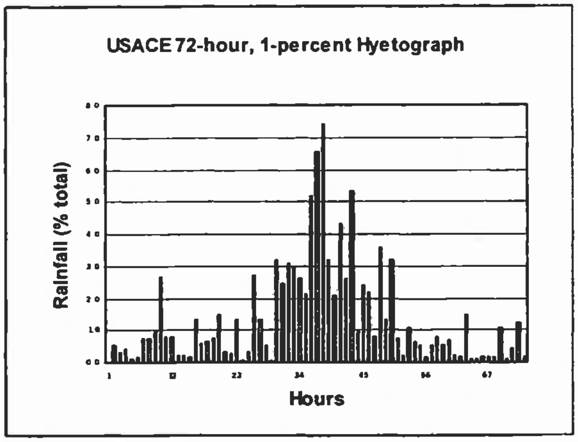
Facility	River Station	Tributary Area (mi2)	Total Pumping Capacity (cfs)	Storage (ac-ft)	Standby Power
Eastside Pump Station	264+00	0.91	100	6.5	no
Fairway Glen Pump Station	332+00	0.65	250	---	yes
Lickmill Pump Station	386+00	0.94	235	---	yes
Nelo-Victor Pump Station	410+00	0.26	160	---	yes
Laurelwood Pump Station	425+00	0.93	130	---	yes
Trimble Outfall	460+00	1.79	n/a	n/a	n/a

Most of the pump stations lack a standpipe system or discharge box to provide constant pumping heads, so coincident tailwater in the Guadalupe River could significantly affects pump performance and therefore discharge to the river. For the purpose of this preliminary analysis, the design 1-percent water surface profile provided by CH2M HILL is used to evaluate pump-station and gravity-outfall capacities.

Methodology

In order to examine pump and basin operation under various scenarios, a design discharge hydrograph is necessary to model local runoff into the basin. Hydrologic analyses utilize information previously gathered for the City of Santa Clara and are modified as needed to reflect conditions at the site.

Design Storm Pattern. To evaluate tributary basin behavior and pump operation under different conditions, estimates of stormwater volume are required. To remain on a consistent basis with previous LGR analyses, the USACE design 72-hour, 100-year storm pattern is used to distribute rainfall. The design 72-hour rainfall depth is 6.72 inches. This pattern, which appears to be the Christmas 1955 storm or similar to it, is shown to the right. One way to refine the analysis would be to examine the merits of a further reduction in 72-hour depth to reflect additional tributary area downstream of Interstate 880.



Runoff Hydrographs. To evaluate collection system facilities where the storage of runoff is important (e.g., basin detention), a synthetic unit hydrograph procedure is used with aforementioned rainfall patterns to produce the requisite runoff hydrographs through a process known as convolution. A unit hydrograph is defined as the basin runoff produced by one inch of rainfall excess applied uniformly over the basin over that unit of time. The Clark dimensionless unit hydrograph is established based on two parameters, t_c, which is equal to the time of concentration (in hours) for that basin, and R, a storage coefficient (in hours) that modifies the peakedness of the unit hydrograph. R is related to t_c by the following ratio which generally ranges between 0.1 and 0.5 within impervious (urbanized) areas:

$$C = \frac{R}{t_c + R}$$

Times of concentration for individual storm drain systems have been calculated, either by Schaaf & Wheeler or the City of Santa Clara, using the Rational Formula.

Infiltration. Direct runoff is equivalent to precipitation in excess of the soil's infiltration capacity. This is based on soil type, land use, cover, and antecedent moisture conditions (i.e., how saturated the soil is at the beginning of the storm event). This analysis uses the Soil Conservation Service (SCS) Curve Number methodology. Table 3 presents SCS Curve Numbers for various existing land-use types for both Antecedent Moisture Condition (AMC) II, and for AMC I½, which we have found to calibrate reasonably well to local stream gage frequency analyses for the 100-year discharge with a 72-hour storm. SCS soil maps for Santa Clara County indicate that most areas tributary to the LGR are underlain by soils classified in Hydrologic Soil Group *D*.

Table 3. SCS Curve Numbers

Land Use	CNAMCII	CNAMCI½
Residential	87	80
High Density Residential	92	87
Commercial	95	91
Golf Course	84	76
Landfill / Open	94	90

Storage Routing. Kinematic wave routines available in HEC-1 are used to route flows down streets (Manning's $n = 0.020$) or in storm drain pipes ($n = 0.013$). Reservoir routing is used to analyze the Eastside detention basin.

Pump Station Operation. Detailed operating parameters have been incorporated into the analyses of the Eastside and Lickmill facilities. Since the Eastside relies heavily upon detention storage, this information is critical. However, as shown on the attached discharge plot for the Lickmill pump station, actual pump cycling is not important on the macro-scale, since pump cycle times are for the most part, less than 15 minutes, which is the computational time step.

Gravity Outfall Above Trimble Road. Local runoff is discharged from the vicinity of De La Cruz Boulevard through roughly 2,500 feet of parallel 48-inch and 72-inch storm drains into the Guadalupe River near Highway 101 upstream of Trimble Road. (River Station 460+00, or Project Station 14+008 in metric.) Based on information taken from the City of Santa Clara's storm drain block maps, the release point for water to flow to the north from De La Cruz is approximately 36 feet NGVD. The parallel RCP drains are equivalent to a single 80.4-inch diameter drain. The design 1-percent water surface elevation at Station 14+008 is 9.93 m NAVD, which can be converted to 39.82 feet NGVD; thus, there are 6.2 feet of available head at De La Cruz to drive water into the Guadalupe River, even at maximum river stage.

Assuming that water is at the top of curb on De La Cruz Boulevard and accounting for the loss of one velocity head upon discharge into the river, the capacity of the 72-inch outfall is approximately 210 cfs, and the capacity of the 48-inch outfall is about 70 cfs. The total estimated gravity discharge at peak design river stage is thus 280 cfs.

Key Assumptions Inherent with These Analyses

The following key assumptions are inherent with these analyses:

- The USACE design hydrology (72-hour, 100-year precipitation event) was used to estimate the amount of rainfall occurring within the LGR study area. No precipitation adjustments or further depth-area reductions were made.
- The study of gravity outfalls upstream of I-880 was not in the scope for this study.
- Floodplain mapping and interior flooding analyses were not part of this investigation.
- Guadalupe River tailwater does have an effect on pumping rates during the design runoff event. This effect was addressed for the Eastside and Nelo-Victor pumping plants, but none of the others. To do so would require detailed hydraulic analyses for the pump station discharge pipes.